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MONTANA ENERGY OFFICE

"PEOPLE MAKE SOLAR WORK"

THE MONTANA SOLAR PLAN

THE GREAT SEAL OF THE STATE OF MONTANA
ORO Y PLATA

MAY 1978

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THOMAS L. JUDGE
GOVERNOR

TED SCHWINDEN
LIEUTENANT GOVERNOR

March 29, 1978

Mr. Ray Gilbert
Solar Planning Office-West
2500 Stapleton Plaza
3333 Quebec
Denver, Colorado 80207

Dear Mr. Gilbert:

Enclosed are elements of the Montana Solar Plan as specified in Montana's application for a Solar Planning Grant dated September 2, 1977. I have been encouraged and impressed by the scope and thoroughness of the entire Solar Planning Effort in Montana, as well as in the Western Region.

Renewable energies are a viable energy source that we must all begin to take more seriously.

Sincerely,

Ted Schwinden

TED SCHWINDEN
Lieutenant Governor

PRINCIPAL CONTRIBUTORS:

Randall F. Moy	-	Energy Research Coordinator and Montana's member in the Western Region's Solar Planning Committee, Montana Energy Office, Helena, Montana.
Kye Cochran	-	Principal Investigator and Managing Director, Alternative Energy Resource Organization (AERO), Billings, Montana.
J. Lee Cook	-	Solar Planning Coordinator, Montana Energy Office, Helena, Montana.
Jan Konigsberg	-	Solar Coordinator, Montana Energy Office

TO THE MEMBERS OF THE MONTANA SOLAR PLANNING COMMITTEE, and in particular Jim Parker, Chairperson, a hearty "THANKS" for your time and invaluable contributions. It is because of your unyielding commitment to renewable energies, that Montana will always stay ahead of others in fostering its development and in ensuring energy supplies are available for future Montana generations.

Randall F. Moy
Energy Research Coordinator

March 1, 1978

"Sunlight, in its many guises, is the force that has shaped and driven the miraculous living fabric of this planet for billions of years. It embodies the best engineering, the widest safety margins, and the greatest design experience we know. It provides amply for our needs, yet limits our greed...is safe, eternal, and free. It falls justly and equitably on south and north, east and west. It increases autonomy, fosters diveristy, and does not hurt the balance of payments. Its quality is consistent and very high."

Theodore B. Taylor
Nuclear Physicist

TABLE OF CONTENTS

RATIONALE AND PHILOSOPHY

SECTION A

THE MONTANA SOLAR PLAN

Rationale and Philosphy

Montanans, well aware of the vast coal reserves in this state, must realize that even this energy source could be exhausted in the 21st century and therefore must be used wisely and carefully as a bridge in the transition to alternative, nondepletable energies.

The Montana Solar Plan represents the fourth step in Montana's efforts to plan seriously for the energy realities of the 21st century. The first step in this progression was the independent efforts of solar innovators, beginning in the late 60's; the second step was the formation of nonprofit grass-roots citizens' groups such as the Alternative Energy Resources Organization, with the purpose of promoting the use of renwable energies; the third step was the establishment by our legislature of the unique Montana Alternative Renewable Energy Sources Program, with its mandate to "stimulate research, development and demonstration of energy sources which are harmonious with ecological stability by virtue of being renewable, thereby to lessen that reliance on nonrenewable energy sources which conflicts with the goal of long-range ecological stability..."[1], and which since 1976 provided grants to Montanans for renewable energy research, development and demonstration projects.

Though it is the fourth step in our overall solar efforts, the Montana Solar Plan is the first step in a vital process: the formalizing, integrating, and coordinating of existing and future renewable energy projects and plans into an organized, logical progression. The importance of this step cannot be overstressed: the long range planning process must begin now, if we are to

make the transition to renewable energy alternatives without having to endure crippling economic and social setbacks early in the next century. Otherwise, Montanans of that era may find themselves without the energy supplies they need to survive.

Montana's philosophy regarding coordinated solar energy development closely parallels that of physicist Amory Lovins, who has developed a sensible, realistic and attractive concept of the 'soft energy path', which he describes thus:

> "There exists today a body of energy technologies that have certain specific features in common and that offer great technical, economic and political attractions, yet for which there is no generic term. For lack of a more satisfactory term, I shall call them 'soft' technologies: a textural description, intended to mean not vague, mushy, speculative, or ephermeral, but rather flexible, resilient, sustainable and benign.
>
> "The distinction between hard and soft energy paths rests not on how much energy is used, but on the technical and sociopolitical structure of the energy system.

Dr. Lovins defines 'soft technologies' by the following five characteristics:

1. They rely on renewable energy flows that are always there whether we use them or not, such as sun and wind and vegetation: on energy income, not on depletable energy capital.

2. They are diverse, so that as a national treasury runs on many small tax contributions, so national energy supply is an aggregate of very many individually modest contributions, each designed for maximum effectiveness in particular circumstances.

3. They are flexible and relatively low technology--which does not mean unsophisticated, but rather, easy to understand and use without esoteric skills, accessible rather than arcane.

4. They are matched in scale and in geographic distribution to end use needs, taking advantage of the free distribution of most natural energy flows.

5. They are matched in energy quality to end-use needs.

Lovins feels that "ordinary people are qualified and responsible to make... energy choices through the democratic political process, and on the social and ethical issues central to such choices the opinion of any technical expert is entitled to no special weight; for although humanity and human institutions are not perfectable, legitimacy and the nearest we can get to wisdom both flow... from the people...

Much of our focus in the Montana Solar Plan, as described in the Introduction, is to bring the philosophy and ideas to the people in ways that they can understand and use. Thus, we use coordinated information dissemination and outreach, training and networking to bring 'soft energy path' information in a variety of forms to all citizens; we initiate basic information-gathering projects to provide a strong groundwork for the development of soft energy technologies; and we integrate our Plan into the existing organizational and governmental structures of the state so that we avoid duplication and so that everyone, from the executive branch down through local governments to the individual citizen, has a vital and recognized role to play.

References

1. Montana's Alternative Renewable Energy Sources Program Law, sec. 84-7404. 1975.

2. Lovins, Amory B., Soft Energy Paths: Toward a Durable Peace. Ballinger Book Co., Cambridge, Mass. 1977. P. 14, 38 and 39.

INTRODUCTION

SECTION B

Introduction

We use fossil energies directly or indirectly in almost every facet of American life. We are so accustomed to having easy and inexpensive access to unlimited supplies of these fuels that we take them and their byproducts entirely for granted. Most of us are unaware of the composition and nature of these energy sources and of where, when and how much of these fuels are being consumed or transformed around us. We don't need to know this in order to use the energy.

The use of solar energy as a replacement for or supplement to these conventional fuels requires an entirely different attitude and awareness. Solar energy is not a 'fuel'; it can't be transported in pipelines or wires or railroad cars and plugged or piped in. It must be understood to be used.

Because of this, a plan for the development of solar energy in a state or region must necessarily rely heavily on a thorough and well-conceived program of education and training. If we are to begin changing our uses and sources of energy in this country, it's as essential to teach the second-hand store owner, housewife, kindergarten child and ballet dancer about energy flows and how best to catch and keep warmth from the sun as it is to teach physics students about the greenhouse effect and the laws of thermodynamics.

So education gets a major emphasis in Montana's suggested solar plan. But we feel that uncoordinated education results in waste of energy and money, and is guaranteed to produce confusion, frustration and duplication; and at the same time we are opposed to the idea of establishing a whole new structure as a vehicle for this education/training process. Instead we would like to follow a tradition already successfully established by organizations. We would like to use the concept of networking for coordination of educational and information-disseminating aspects of our solar program. We define networking as the establishment of

strong information exchange and working relationships between all types of organizations from libraries to solar manufacturers in order to facilitate cooperative action and production.

The Western Region has demonstrated its endorsement of the networking concept by naming its central operational organization "Western Solar Utilization Network", or "Western SUN".

Our Plan emphasizes also the necessity for coordinated solar research and development in the state and region. Here again we feel that a good network and sharing of information between existing research and development institutions and organizations in the state, among states, and in the region can get the job done with a minimum waste of energy, time and money.

A major reason for the push to utilize renewable energies in this country is that we are running low on conventional energy and 'feeling the pinch'. Montana thinks that it's necessary to coordinate one of the best renewable energy sources we have--our people-- in order to handle most efficiently and economically the immense job of re-educating and training those who must learn about solar energy to use solar energy: our people. Only after citizens establish an educated demand for a viable solar market and the economics of solar systems become more attractive can we truly expect to develop the 'pull' to bring the solar industry along. A natural corollary to the establishment of the solar market will be the disappearance of many of the barriers hindering solar development and the appearance of many incentives to solar commercialization.

Montana's plan goes to the root of our difficulties with solar development: code barriers, disincentives, disregard of opportunities, allowance of overpricing, shoddy workmanship and poor design, etc. -- all arise from the problem of lack of knowledge and understanding of this new/old energy source on the part of most citizens. We cannot institute tax incentives if people don't know how to take advantage of them; we cannot get building codes changed if those responsible do

not understand why; we cannot encourage builders and architects to design structures that take advantage of solar energy if they do not understand how it will help them; and prospective solar buyers may be sold overpriced and badly designed and built wares if they don't know what to look for.

By thus establishing programs which will pull together existing projects and organizations and provide a strong base of educated populace encouraging further solar development, Montana avoids "bandaid," tack-on projects which cannot be integrated or coordinated with others; instead we offer a sensible, flexible and thorough plan which will produce immediate results and, in addition, will grow in depth and strength with the passing years.

ORGANIZATIONAL STRUCTURE

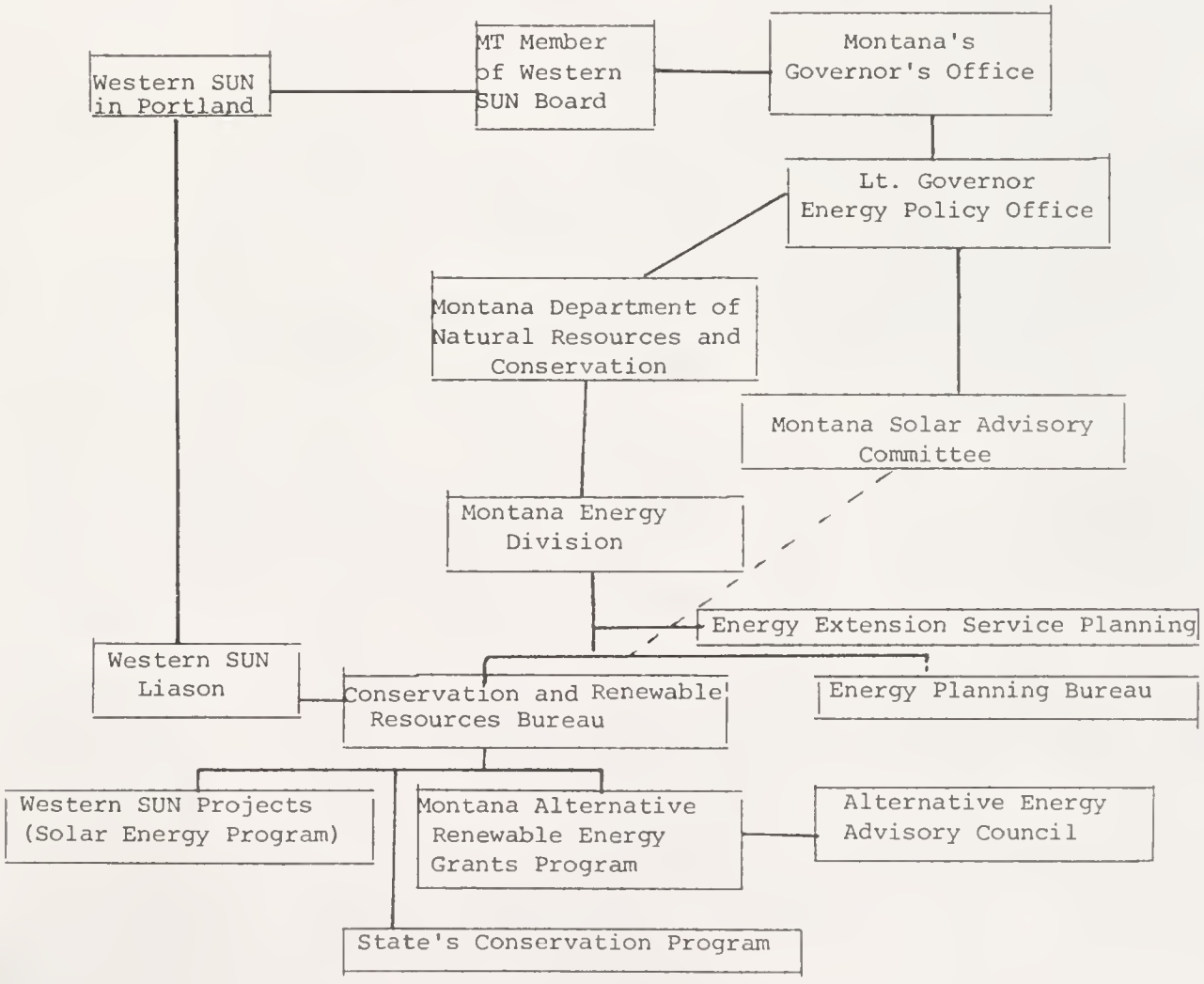
SECTION C

Integration into Montana's Present Governmental Structure (Proposed Only)

Using as guidelines our stated goals of creating a strong networking capability and of making use of existing organizations, agencies and institutions, Montana proposes to integrate the Montana Solar Plan into present state structure as follows:

A renewable energy bureau or branch will be created in the present state Department of Natural Resources and Conservation, under its Energy Planning Division, which also handles the 3-year old Alternative Renewable Energy Sources Program and for the new Montana Solar Program funded by Western SUN; the two programs complement each other well.

The following diagram depicts the proposed composition of Montana's state government as integrated with the Solar Program:



The following is a description of the proposed role of each primary participant in the Solar Program. We first list the responsibilities (in Capital letters for high priority, and small letters for lower priority) of the participant, and then give a short narrative for clarification:

1. Montana's Member of the Western SUN Board of Directors

LIASON BETWEEN WESTERN SUN AND MONTANA'S STATE EFFORTS

Montana's member of the Western Sun Board is appointed at the pleasure of the Governor. It shall be the responsibility of Montana's Solar Advisory Committee to provide the Governor with names of at least three qualified individuals for his consideration for this appointment.

2. The Energy Policy Office (Lieutenant Governor's Office)

MONITOR THE SOLAR PROGRAM
KEEP EXECUTIVE BRANCH INFORMED OF PROGRESS

The Montana Energy Office was mandated by Governor Thomas L. Judge, in a letter to Lt. Governor Ted Schwinden dated May 20, 1977, "to develop and administer a comprehensive resource and energy program for the State of Montana, utilizing existing staff, appropriate state agencies, and maximum input from the citizens of this state . . . Montana's energy and resource program should include . . . A state program encouraging maximum use of alternative energy sources . . ."

The Montana Energy Office has been the prime developer of the Montana Solar Plan. This office underwent a reorganization in May, 1978, and the resulting Energy Policy Office of the Lieutenant Governor's Office will continue to monitor and assist with the solar program, and keep the state Executive Branch advised of the program's progress.

3. Solar Advisory Committee

GUIDANCE/DIRECTION OF SOLAR EFFORT
SPECIAL STUDIES/PROGRAMS
SOLAR LEGISLATION

solar planning
workshops
networking
solar media communications
information dissemination

Montana's Solar Advisory Committee, sensitive to the needs and desires of Montana's citizens, will continue to meet regularly, as they have since August of 1977. The Committee will become somewhat more formalized in structure: it will be comprised of ten people (with one alternate apiece). Five of these, chosen originally by the Montana Energy Office and subsequently elected by their constituencies from the Governor's Legislative Planning Regions will represent the state (figure A). These five regions will organize local renewable energy/ conservation committees to bring about change in their areas. The remaining five will be representatives of: the state legislature; utilities; solar research/ manufacturing community; education (primary/secondary); and Montana's Native American Community. They will be selected in some manner by the Montana Energy Division, and appointed by the Executive Branch. Two ex officio members of the Committee will represent state government and the university system. These two will also be chosen by the Montana Energy Division originally, and elected by the Committee in future years.

A chairperson, a secretary and a treasurer will be elected by the membership and will serve single-year terms. The Committee will conduct its own bookkeeping.

The Committee will meet at least bi-monthly, and will mail copies of the minutes of the meetings to a comprehensive list of recipients including all Montanans who wish to receive them.

The Montana Solar Advisory Committee will advise the Governor on his selection of the Montana member of the Western SUN board of directors. It will

provide leadership and direction to the state solar program, will keep close contact with Montana's executive branch and Western SUN's Field Representative, will identify possible needed legislation, and will initiate special studies and projects.

The Solar Advisory Committee has already proved itself capable in these areas. It has helped produce our state Solar Plan; has conducted a very successful financiers' informational workshop; is providing guidance to the Montana Energy Division and several grass roots organizations in the production of a comprehensive Montana Solar Directory; is cooperating with the state Alternative Renewable Energy Sources Program to identify barriers to solar development which might require legislation; and worked with the Montana Energy Office, the Executive Branch, and others to help coordinate Sun Day activities.

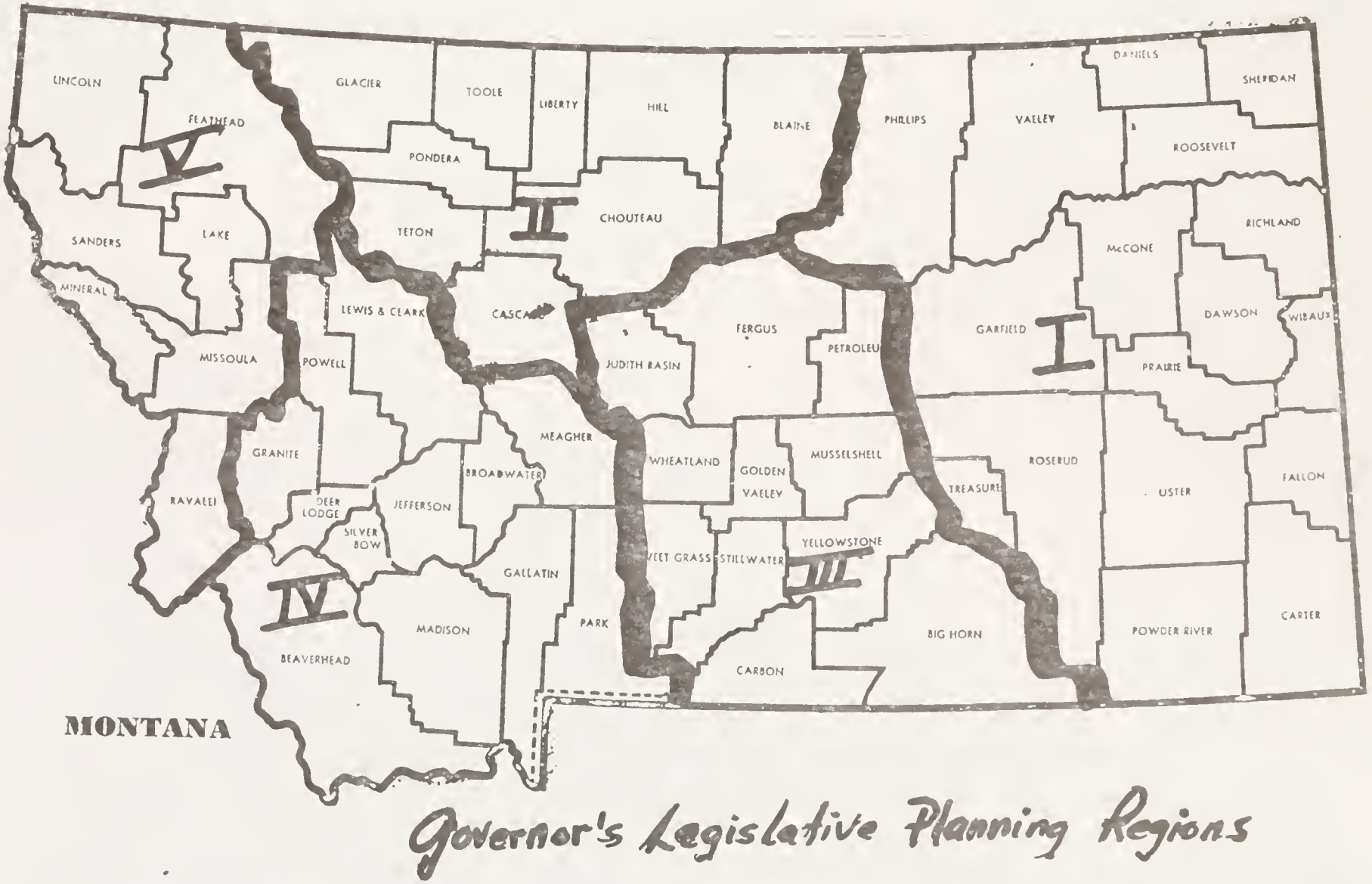
4. Conservation and Renewable Resource Bureau

ADMINISTRATION OF ALTERNATIVE RENEWABLE ENERGY RESOURCES PROGRAM
ADMINISTRATION OF SOLAR ENERGY PROGRAM (WESTERN SUN-FUNDED PROJECTS)
information compilation and dissemination
commercialization information compilation
federal/state coordination
fielding of questions (phone and letter)
research project coordination

The Conservation and Renewable Resources Bureau will have a manager (with support personnel) who is responsible for the Solar Energy Program as sponsored by Western SUN, the Montana Alternative Renewable Energy Sources Program, and the state's Conservation Program.

5. Western SUN Projects (Solar Energy Program)

EDUCATION
TRAINING
WORKSHOPS
NETWORKING
INFORMATION DISSEMINATION
research (wind monitoring, etc.)
solar planning
evaluation/performance



Governor's Legislative Planning Regions

C-5

600 7-61 35304 TRIBUNE

Each of our initial 19 suggested projects to be funded by Western SUN is described in detail in the "Projects" section of this document.

A manager and support personnel will be established in the Conservation and Renewable Resources Bureau. The manager will work closely with the Western SUN Field Representative and the state Solar Advisory Committee to identify and select a contractor for each solar project from among qualified organizations, individuals, agencies and institutions in the state. As soon as the Networking Program is established, an important function of its staff will be to aid in this contractor-identification process.

Contingent upon the federal Department of Energy's funding of Western SUN projects proposed, staff will be available to handle such duties:

- Compiling a list of the most useful solar books, and seeing that they are acquired by all libraries
- Keeping the Solar Directory updated
- Keeping a current file on solar events, news, literature, pamphlets, brochures
- Producing (or getting produced) booklets, pamphlets, brochures
- Keeping contact with the Western Informational Network on Energy (WINE)
- Collecting data on all renewable energy hardware, prices, suppliers
- Coordinating information/contacts on setting up businesses, cottage industries, etc.
- Keeping a current file on federal and state grants, loans, tax breaks, coordinating/funneling information to people and organizations to whom it will be useful
- Keeping up a strong 2-way exchange of information with federal agencies
- Taking responsibility for obtaining federal matching funds for state grant programs and for Western SUN funding projects
- Answering inquiries (phone, letter, visitors) and referring questions to more appropriate experts when necessary
- Identifying people/organizations capable of doing research, and discovering each's capabilities

- Identifying important research/data-gathering tasks

- Working with the Conservation and Renewable Resources Bureau Manager, Western SUN Field Representative to assure that appropriate researchers get appropriate research contracts

6. Montana Alternative Renewable Energy Sources Program

RESEARCH
DEVELOPMENT
DEMONSTRATION
INFORMATION DEVELOPMENT
DATA COLLECTION
EVALUATION/PERFORMANCE
information dissemination
solar planning

The long-range goal of Montana's Alternative Renewable Energy Sources Program is to strive for energy self-reliance for Montanans, based on Amory Lovin's "Soft Energy Path" approach. This program has been very successful in the areas of research, development and demonstration; with a good showing of funded single family solar dwellings, small-scale hydro projects, wood energy projects and small wind projects in progress, the program's staff are now looking toward expanding the program into new areas.* (see page C-8)

The areas which our Alternative Renewable Energy Sources Program has not been able to address will be dealt with by our Solar Energy Program: education, information dissemination, media communications, networking, resource identification and data gathering. Therefore we contend that the two programs, housed together in our Montana Energy Division, will be able to work together in close coordination to address all aspects of an integrated solar effort.

7. Western SUN Field Representative

COORDINATE WESTERN SUN SOLAR EFFORTS IN STATE AND REGION
HELP DEVELOP PROGRAMS FOR WESTERN SUN FUNDING
EVALUATE STATE PROGRAMS FOR WESTERN SUN
networking
working with solar advisory committee

The Field Representative has two bosses: Western SUN and the administrator

of the Montana Energy Division, DNRC. His/her main job is to see that Western SUN projects and state efforts are closely coordinated, workable and adapted to state and regional needs.

* Areas being considered:
  - Development of combined systems for single and multifamily dwellings using several integrated renewable energy sources
  - Development and demonstration of renewable energy systems appropriate for the agricultural community
  - Wind generator demonstrations of 4 Kw-1 MW size
  - Various development and demonstration projects involving biomass
  - Research into a coordinated strategy for possible gasohol and hydrogen production
  - Industrial applications for renewable energy

MONTANA SOLAR PLANNING COMMITTEE MEMBERS

SECTION D

MONTANA SOLAR PLANNING COMMITTEE MEMBERS

CONSTITUENCY	NAME	TOWN	PHONE	BUSINESS
ducation	Ron Erickson	Missoula	243-6273	University of Montana
echnical	Frank Smoyer	Helena	443-5273	MERDI-Engineer
echnical	Michael Schara	Helena, 1930 Brady	443-1950	Engineer
ov't. State	Jim Whitehead	Helena	449-3773	Lt. Governor's Office
ov't. State	Gerry Knudsen	Helena	449-3780	DNR&C
ocial Services	Gene Leuwer	Helena, Box 721	442-1139	Rocky Mountain Dev. Council
ocial Services	Bob Noble	Bozeman-Msla.	728-3710	Human Resources Dev. Counci
ocial Services	Peitr Zwolle	Great Falls, Box 2532	761-0310	Opportunities, Inc.
tility	Larry Geske	Great Falls, Box 2229	761-7100	Great Falls Gas Co.
ov't. Assoc.	Jim Lubek	Helena, 1000 9th	442-8768	MT League of Cities & Towns
ocial Services	Jim Parker	Helena, Box 1154	443-7056	Center for Social and Environmental Concerns
echnical	Leo Belanger	Butte, Box 3809	494-4569	MERDI
rassroots-rganizational	Kye Cochran	Billings, 435 Stapleton Bldg.	259-1958	AERO
echnical	Charless Fowlkes	Bozeman, 1820 South 7th		Engineer
rofessional	Gus Percha	Helena, 801 N. Warren		Architect
nvironment	Sanna Porte	Helena, Box 12		Environment Specialist
ocial and ducation	John Nichols	Helena, 120 South Last Chance Gulch		Director of City Library
rofessional	Eileen Shore	Helena		Lawyer, Governmental, EQC
echnical	Sue Brown	Butte, Box 767		Montana Trade Commission, Engineer
rofessional	Randy Moy	Helena, Capitol Station	449-3940	MT Energy Office
ov't. Assoc.	J. Lee Cook	Helena, Capitol Station	449-3940	MT Energy Office
ov't. Assoc.	Jan Konigsberg	Helena, Capitol Station	449-3940	MT Energy Office

MONTANA ORGANIZATIONS INVOLVED WITH RENEWABLE ENERGIES

SECTION E

MONTANA ENERGY RESOURCE AGENCIES

1. Alternative Energy Resources Organization (AERO)
   435 Stapleton Building
   Billings, Montana
   Ms. Kye Cochran, Administrator
   (406) 259-1958

2. Alternative Energy Resources Organization-West (AERO-West)
   323 West Alder
   Missoula, Montana
   Mr. Scott Sproull
   (406) 549-0666 (Scott's business phone)

3. Center for Social and Environmental Concerns (CSEC)
   Power Block Building, Third Floor
   Helena, Montana
   Jim Parker, Administrator
   (406) 443-7056

4. Department of Natural Resources (DNRC), Division of Energy Planning
   32 South Ewing
   Helena, Montana
   Gerhard Knudsen, Project Manager
   (406) 449-3780

5. Environmental Information Center (EIC)
   Box 12
   Helena, Montana
   Ms. Sanna Porte, Contact Person
   (406) 443-2520

6. Environmental Quality Council (EQC)
   Capitol Station
   Helena, Montana
   Ms. Eileen Shore
   (406) 449-3742

7. Human Resources Development Councils (10 Districts in the State)
   1424 9th Avenue
   Helena, Montana
   John H. Allen, Administrator
   (406) 449-3420

8. Montana Energy and MHD Research and Development Institute
   Box 3809
   Butte, Montana
   Dr. Jerry Plunkett, Administrator
   (406) 449-6100

9. Montana International Trade Commission
   Box 767
   Butte, Montana
   Ms. Susan Brown, Project Engineer
   (406) 723-3228

10. Rocky Mountain Development Council
    201 South Main
    Helena, Montana
    Mr. Dan Sullivan, Contact Person
    (406) 442-1552

11. Northern Rockies Action Group, Inc.
    9 Placer Avenue
    Helena, Montana
    Mr. Marc Carlson, Contact Person
    (406) 442-6615

12. Center for Innovation
    Box 3809
    Butte, Montana
    Mr. James Beattie, Contact Person
    (406) 494-4569

13. New Western Energy Show (NWES)
    842 5th Avenue
    Helena, Montana
    Mr. David Nimick, Director
    (406) 442-4582

14. Montana Energy Office (MEO)
    1426 9th Avenue
    Helena, Montana
    Mr. J. Lee Cook, Contact Person
    (406) 449-3940

15. National Center for Appropriate Technology
    Box 3838
    Butte, Montana
    Mr. Blair Hamilton
    (406) 723-6533

SOLAR STATE-OF-THE-ART IN MONTANA

SECTION F

INVENTORY OF RENEWABLE ENERGY DEVICES IN MONTANA

Montana's portion of President Carter's goal of 2.5 million solar homes in the country by 1985 is 8500 solar homes. To better understand what Montana must do to achieve this goal, it is necessary to obtain some idea as to what has been achieved already in the state. The Alternative Energy Resources Organization (AERO) in Billings, Montana, and its affiliate AERO-West in Missoula conducted an inventory for the Montana Energy Office (MEO) of renewable energy devices and systems across the state. The inventory is probably only 60-70% accurate; but nonetheless, it does provide us with a reliable base to start from and the results are impressive.

The inventory raised a response from builders of 123 renewable energy devices in 35 of Montana's 56 counties. They are largely concentrated in five counties: Cascade 21, Missoula 15, Ravalli 13, Lewis and Clark 13, and Gallatin 8. We found renewable energy systems on 79 homes, two schools, office building, library, museum, 2 banks, condominium, garages, shops and other facilities. Forty-one homes had both domestic hot water and space heating renewable energy systems. Solar reliant greenhouses (25) have been sprouting up across the state in the last few years as people turn to solar systems to grow their own food. Solar panels are heating swimming pools. Trailer houses (3) are being retrofit to passive and active solar systems. We found passive homes being built, these include a geodesic dome and an earth-covered conference room. Photovoltaics are being used on a highway restroom and on a radio repeater. We found parabolic and tracking concentrating collectors and flat collectors of various sizes and types. One group has started a cottage industry building solar food dehydrators. Researchers are looking at biochemical and microbiological aspects of anaerobic fermentation of biomass for methane production. Research projects are underway in developing hot air collectors

and wind machines. Insolation and wind data are being gathered. Two organizations are presently gearing up to manufacture solar devices while nearly a dozen are in the retail business.

Results of this survey indicate that Montana has developed an excellent renewable base to support the implementation of the solar plan developed by the Montana Solar Planning Committee and the Montana Energy Office.

RESULTS OF PUBLIC OPINION SURVEY

SECTION G

RESULTS AND ANALYSIS OF THE MONTANA SOLAR QUESTIONNAIRE

Prepared by

Jan Konigsberg

Montana Energy Office

May 1, 1978

INTRODUCTION

The Montana Solar Questionnaire stems from an agreement between the Montana Energy Office and Solar Planning Office-West to conduct a state-wide public opinion survey for an initial assessment of attitudes toward solar energy.

Specific objectives of the survey included the following:

1. Determine legislators' willingness to support state legislation to facilitate the development of solar in the state of Montana.
2. Determine the public's willingness to support state legislation to facilitate the development of solar in the state of Montana.
3. Determine the attitudes about future state energy strategies.
4. Assess the sophistication of the public's knowledge about solar energy.
5. Determine perceptions about obstacles to solar development in Montana.
6. Determine perceptions about incentives to solar development in Montana.
7. Measure the support for more energy education in the public schools.
8. Measure the support for utilities assessing a special charge for renewable energy users receiving backup power from the utility.
9. Determine individuals' willingness to become personally involved in the application of solar energy.

Under the direction of Professor Ken Tiahrt, the survey was mailed and tabulated by the staff of the Statistical Center at the Montana State University in Bozeman on January 13, 1978. On February 17, a reminder postcard was mailed to all 150 Montana state legislators and 2850 Montana residents. The respondents were selected using a scientific random sample from Montana's statewide motor vehicle registration list. Sixty-five legislators and 649 residents responded. The questionnaires were color coded to distinguish between legislators and citizens. The number of returns was sufficient to ensure a 95% confidence level for the total data.

Data analysis included the tabulation of the total number of responses to each question. When questions were analyzed by demographic data, the number of responses in a given category may not have been large enough to show strong statistical validity. The tendencies in opinions in these situations were, however, useful in the preparation of this report. For other observations, it can be assumed that the relationships were statistically significant. Responses from one question were cross-tabulated with responses to another question if the two questions bore some meaningful relationship. This report will include only the most relevant of those cross-tabulations.

EXPLANATION OF DEMOGRAPHICS

Area: The questionnaire was mailed statewide. Each respondent was requested to identify their county or residence. Analysis of the returns shows that the percentage of respondents from each county correlates closely with the county's percentage of the state's total population.

Age: The respondents were divided into six age categories. The age groups were: under 20, 20-29, 30-39, 40-49, 50-59, 60+. The percentage of respondents in each category does not coincide with the percentage of the state's total population.

Sex: Respondents were asked to identify their sex. Of those who identified their sex, 83.1% were male and 16.9% were female. These percentages compare with a breakdown of 50.0% male and 50.0% female for the state's total population. This disparity can be partly explained by the fact that registered motor owners are primarily male.

Place of Residence: Each respondent was asked to identify his place of residence. The categories of place or residence were as follows: city over 10,000, town 2,500-10,000; town 1,000- 2,500; rural nonfarm; and rural farm. The percentages of respondents in each category correspond closely to the breakdown of the state's total population.

Home Ownership: Respondents were asked to indicate if they owned or rented their home. Of those who responded to the question, 91% own their home and 9% rent.

Energy Consumer Identification: Respondents were asked to identify both the utility from which they purchase their energy and their primary role as an energy consumer. The utilities which serve Montana customers with the percentage of respondents served by each utility follows: Montana Power Company, 66.1%; Montana-Dakota Utility, 9.1%; Pacific Power and Light, 3.5%; and Rural Electric Co-ops, 17.3%. The categories identifying the respondents' primary role as an energy consumer with the percentage of respondents in each role are: residential consumer, 77.7%; commercial consumer, 5.0%; and agricultural consumer, 14.5%.

Income: Respondents were asked to indicate their household income. The income categories were $0-$5,000; $5,000-$10,000; $10,000-$15,000; $15,000-$20,000; $20,000-$25,000; $25,000+.

I. THE DEGREE OF SOPHISTICATION OF KNOWLEDGE ABOUT SOLAR ENERGY

Proposition #2:

"You have to be an expert to install a solar system in your home."

	Public	Legislators
Strongly Agree	7.6%	3.1%
Agree	23.5%	23.1%
No Opinion	9.1%	10.8%
Disagree	38.2%	52.3%
Strongly Disagree	5.9%	3.0%
Don't Know	14.6%	7.7%
No Answer	1.1%	0
(Total)	(100.0%)	(100.0%)

Observations:

1. As many as 4 out of 10 of the public respondents and 5 out of 10 legislators disagree with the above proposition. The level of disagreement indicates that many respondents believe that installation of solar energy systems are well within their abilities.

2. When this proposition is compared with the public's schooling the following data emerges:

How does the person's level of education relate to their response to Proposition #2?

	Grade School	High School	College
Agree	41.3%	24.7%	33.5%
Disagree	28.6%	48.5%	44.9%
No Opinion	9.5%	10.8%	7.8%
No Response	20.6%	16.0%	13.8%
(Total)	(100.0%)	(100.0%)	(100.0%)

Those with at least a high school education are more likely to disagree with the proposition than those with only a grade school education.

Proposition #3:

"It will be at least twenty years before this country will possess the technology to make solar feasible for home heating!"

	Public	Legislators
Strongly Agree	4.9%	7.7%
Agree	15.4%	16.9%

(Continued)

Proposition #3 (Continued)

	Public	Legislators
No Opinion	8.0%	6.2%
Disagree	40.5%	43.1%
Strongly Disagree	20.0%	21.5%
Don't Know	10.0%	4.6%
No Answer	1.2%	0
(Total)	(100.0%)	(100.0%)

Observations:

An overwhelming majority of respondents disagreed with the above proposition. From this response it may be valid, therefore, to infer that the majority of respondents believe the technology for solar heating of homes is feasible in twenty years or less.

Proposition #8:

"Please write the appropriate number which you believe best reflects your knowledge about each type of solar system:"

	Very Knowledgeable		No Knowledge	
	Public	Legislators	Public	Legislators
Active Solar Space Heating	3.2%	12.3%	32.5%	18.5%
Passive Solar Space Heating	3.2%	9.2%	37.1%	18.5%
Solar Domestic Water Heating	4.8%	10.8%	21.0%	7.7%
Geothermal	3.9%	4.6%	28.8%	21.5%
Wind	7.4%	4.6%	16.6%	7.7%
Water	6.3%	9.2%	17.4%	9.2%
Biomass	6.8%	6.2%	26.0%	12.3%

Observations:

1. Referring to the tabulation of responses (#8) in the appendix, the majority of all respondents feel they lack knowledge of the various solar energy systems. However, legislators as a group consider themselves slightly more knowledgeable about solar energy than does the public. Since this response only reveals the respondents' self-evaluation, there is no way to know whether legislators who responded are in fact more knowledgeable than the citizens who responded.

2. Wind received the greatest percentage of responses from the public under the most knowledgeable heading, while active space heating received the most responses from legislators under the same heading. However, when legislators' responses under columns #1 and #2 (see Appendix, Proposition #8) are added together, wind energy received the greatest percentage.

3. Overall knowledge about solar energy systems among those who responded to the survey is lacking. This observation seems to indicate a need for effective public education about solar energy.

II. OBSTACLES TO AND INCENTIVES FOR SOLAR DEVELOPMENT

When asked to indicate the most important obstacle hindering the development of solar energy in Montana, the following responses were given:

	Public	Legislators
Utility opposition to solar	15.3%	7.7%
Lack of information about the feasibility of solar energy in Montana	38.8%	43.1%
Cost of converting to solar	21.9%	30.8%

(Continued)

	Public	Legislators
Solar technology is too experimental	7.6%	13.8%
Failure of state and local officials to support solar	3.9%	1.5%
Other	4.5%	1.5%
No Answer	8.0%	1.6%
(Total)	(100.0%)	(100.0%)

Observations:

1. Citizens and legislators perceive lack of information about the feasibility of solar energy in Montana as the most important obstacle to solar development, cost of converting to solar ranks as the second most important obstacle to the development of solar.

2. Only a very small number of ciitizens and legislators believe solar development in Montana has been delayed by lack of support by public officials.

When asked to indicate the most important factor facilitating the development of solar energy in the state the following responses were given:

	Public	Legislators
Additional state solar legislation	3.8%	9.2%
Federal solar power legislation	5.7%	7.7%
Public education program about solar energy	43.5%	38.5%
Certification of solar products according to rigid engineering criteria	5.2%	4.6%
More state and federal grants to develop and demonstrate solar system	15.6%	16.9%
Support for solar from building trade and financial institutions	11.0%	12.3%
Other	4.3%	7.7%
Don't Know	10.9%	3.1%
(Total)	(100.0%)	(100.0%)

Observations:

1. Citizens and legislators believe that a public education program about solar would be the most important factor to facilitate its development, and that additional grants would be the next in importance.

2. Although citizens and legislators agree on the importance of public education, the content of such a program has yet to be adequately defined. Before the concept of public education about solar energy is promoted by public officials, the contents of such a program as well as the educational methods must be formulated. Moreover, before additional grants are given for solar energy, policy makers need to decide on the types of solar systems that should be developed and demonstrated.

III. PERCEPTIONS ABOUT DEVELOPING SOLAR ENERGY IN MONTANA

Proposition #11:

"In Montana we should concentrate our efforts in developing the following solar options."

	Public	Legislators
Passive Solar Systems	26.1%	47.7%
Domestic Solar Water Heating	48.3%	64.6%
Active Solar Space Heating	43.5%	47.7%
Geothermal	31.9%	27.7%
Wind Energy	58.7%	63.1%
Biomass Energy Systems	27.0%	26.2%
Wood Stove	23.9%	35.4%
Don't Know	15.6%	12.3%

(Since respondents were asked to check as many systems as they wanted, the percentage cited for each system is a percentage of the total number of respondents.)

Observations:

1. Responses from both the public and the legislators show they most favor the development of wind energy and domestic water heating systems. Research tentatively reveals that domestic hot water systems are the most cost effective of all solar systems for Montana now. The economics of wind systems in Montana are not that clear. Large scale generation from wind promises to be economically feasible when compared with the rising costs of electricity generated from coal-fired plants. Small scale wind generation, however, is presently expensive unless most of the system is hand fabricated using used and/or off-the-shelf hardware (e.g., auto parts). Moreover, mass production of small wind systems will lower their costs considerably. A major reason for the support of wind energy development might be because eastern Montana has some of the highest average wind velocities in the nation (Livingston is the second windiest place in the country).

2. When asked to identify (Proposition #13) the most important obstacle hindering the development of solar energy in Montana, lack of information received the greatest percentage of responses from both the public and legislators, (43.1% of the legislators and 38.8% of the public (see Appendix for other responses to this question). Similarly, public education about solar received the greatest percentage of responses from both the public and legislators as the factor that would most facilitate the development of solar in the state (Proposition #14). This response is further supported by 70.1% of the public and 81.5% of the legislators agreeing that a Montana Solar Handbook would be useful to them (Proposition #24).

3. Although the responses cited thus far indicate considerable support for solar energy, the survey does not provide sufficient information to determine the real commitment of the respondents to solar energy. When respondents were asked to choose the type of heating system they would install in their homes today

(Proposition #10), only 14.8% of the public and 12.3% of the legislators chose a renewable energy system:

	Public	Legislators
Electric Baseboard	14.3%	20.0%
Electric Air	2.9%	4.6%
Gas	18.8%	26.2%
Heat Pump	10.2%	12.3%
Coal	6.8%	7.7%
Oil	4.3%	4.6%
Renewable	14.9%	12.3%
Wood	14.1%	6.1%
Propane	1.7%	0
No Answer	12.0%	6.2%
(Total)	(100.0%)	(100.0%)

When this question was cross-tabulated* with income the following data emerges:

	Income (In Thousands of Dollars)					
	0-5	5-10	10-15	15-20	20-25	25+
Electric Baseboard	6.52%	15.0%	16.67%	13.28%	14.29%	15.29%
Electric Air	6.52%	1.0%	4.86%	2.34%	2.20%	3.53%
Gas	10.87%	15.0%	16.67%	17.97%	23.08%	31.76%
Heat Pump	6.52%	3.0%	8.58%	14.06%	12.09%	18.82%
Coal	13.04%	6.0%	6.0%	7.03%	7.69%	2.35%
Propane	6.52%	2.0%	0	2.34%	1.10%	0
Oil	6.52%	5.0%	4.86%	1.56%	4.40%	4.71%

* No cross-tabulation in this report incorporates legislators' responses, only the responses from the public are considered.

	0-5	5-10	10-15	15-20	20-25	25+
Renewable	8.70%	19.0%	16.67%	20.31%	10.99%	11.76%
Wood	21.74%	20.0%	15.97%	10.94%	14.29%	4.71%
No Response	13.0%	14.0%	9.72%	10.16%	9.89%	7.06%
(Total)	(100.0%)	(100.0%)	(100.0%)	(100.0%)	(100.0%)	(100.0%)

Although it's difficult to draw any conclusions from this cross-tabulation, those respondents in the middle income seem to be more willing to invest in renewable energy. On the other hand, 73.0% of the public and 64.6% of the legislators responded that they would consider installing a solar device in their home sometime in the future.

4. In addition, 91.2% of the public and 89.2% of legislators agree that Montana's public schools should instruct students in solar energy and the energy crisis (Proposition #6). Slightly less support (79.6%, public; 75.3%, legislators) exists for implementing vo-tech training in solar energy (Proposition #7).

IV. ATTITUDES ABOUT ADDITIONAL SOLAR LEGISLATION

Degree of support for additional legislation:

	Agree		Disagree	
	Public	Legislators	Public	Legislators
Tax Credit for Wood Stoves	52.6%	47.6%	27.9%	35.4%
Increase Tax for Renewable Energy	65.9%	58.5%	12.8%	36.1%
Property Tax Exemption	67.0%	56.9%	15.8%	18.4%
Retrofit Public Buildings	38.4%	29.3%	30.9%	31.3%
Install Solar on New Public Buildings	69.8%	61.6%	12.2%	15.4%
Tax Credit for Passive Designs	60.1%	49.2%	19.6%	28.2%
Increase Percentage of Monies for SB 86 Program	69.2%	53.8%	9.6%	18.5%
Appropriate Funds for Agricultural Solar Application	57.8%	49.2%	21.8%	16.9%

Observations:

In general both the public and legislators are inclined to believe a need exists for state legislation to promote solar development in the state. As indicated in the table above, there is strong support for increasing the percentage of monies to Montana's Renewable Energy Research, Development and Demonstration Program (SB 86). The only legislative option which did not receive substantial support was the proposal to retrofit public buildings with solar systems. These results reveal a willingness to at least re-allocate if not extend more public funds for solar development. However, if the legislature considers additional solar legislation during the next session. funding new or expanded solar programs will face competition from other significant programs.

V. ATTITUDES TOWARD STATE ENERGY STRATEGY

Proposition #12:

"To meet future state energy needs, I favor the following strategy:"

	Public	Legislators
Nuclear: Construction of nuclear plants	15.1%	16.9%
Conservation: Conservation, phase-out coal-fired plants, develop solar systems	18.6%	26.2%
Solar: Rapid development of solar	18.6%	9.2%
Coal: Construction of more coal-fired plants	14.3%	13.8%
MHD: Development of alternative technologies	26.8%	30.8%
No response	6.5%	3.1%
	n=649	n=65

Observations:

1. For purposes of analysis both the conservation and solar options (see Questionnaire in the Appendix, question #12 b&c) represent a solar strategy. Consequently, the responses to both options can be combined to reveal the level of a support for a solar strategy which favors a transition to a renewable energy system in the state with increasingly less dependence on fossil fuels.

When the responses are combined, 37.2% of the public and 35.4% of the legislators support a solar strategy.

It is unlikely that most respondents who favor the solar strategy or the MHD strategy understand either the technology involved or how the transition to a different energy system will be accomplished.

2. When responses to the assertion (proposition #4), "If we learn to use less energy, that doesn't necessarily mean that we will have to give up a lot of things that are dear to us," are cross-tabulated with the responses on energy strategy the following percentages result:

Proposition #4:

	Public	Legislators
Agree	77.7%	84.6%
Disagree	15.1%	10.7%
No Response	7.2%	5.7%
(Total)	(100.0%)	(100.0%)

How do the responses to Proposition #4 relate to the responses regarding energy strategy?:

	Nuclear	Conservation	Solar	Coal	MHD
Agree	79.59%	82.64%	75.20%	72.04%	83.24%
Disagree	13.27%	13.22%	19.0%	22.58%	11.65%
No Opinion	2.04%	2.48%	1.65%	3.23%	2.31%
No Response	6.12%	1.65%	4.13%	2.15%	3.47%

Although one would expect that those who favor a nuclear, coal or even an MHD type strategy would be inclined to believe that lowering energy consumption would mean a lower standard of living, the above table does not support such an assumption. In fact, whether or not a respondent agrees or disagrees with the assertion relating energy consumption to life style has little bearing on the state energy strategy the respondent favors.

In addition, cross-tabulating the assertion "If we learn to use less energy, that doesn't necessarily mean that we will have to give up a lot of things that are dear to us." with the categories of age, schooling, type of power consumer and income groups we find that in no case is there a significant difference in response to the assertion between subgroups in each category.

3. When the various energy strategies are cross-tabulated with the categories of schooling, age, income, primary role as an energy consumer and reasons respondent chose to live in Montana, the cross-tabulations suggest that the solar energy strategy receives the greatest support from those with one or more years of college, those between the ages of 20 and 50, as well as those whose primary reason for living in Montana is either outdoor recreational opportunity or community involvement.

The greatest support for construction of more coal-fired plants comes from those with grade school education, from those over 50 as well as those who define their role as a commercial consumer of power.

These observations are extremely tenuous and should not be construed to be conclusive about the relationship between the attitudes of all Montanans regarding state energy policy and the variables cross-tabulated with attitudes such as income and age.

The following tables are the percentages which result when the various energy strategies are cross-tabulated with the categories of schooling, age, income, primary role as power consumer, and reasons respondent chose to live in Montana:

How does a citizen's level of schooling compare to his choice of energy strategy?

	Schooling		
	Grade School	High School	College
Nuclear	14.29%	15.15%	15.27%
Conservation	9.52%	15.15%	23.05%
Solar	11.11%	20.78%	18.86%
Coal	23.81%	14.72%	12.57%
MHD	23.81%	30.73%	25.45%
No Response	17.46%	3.46%	4.79%
	n=649		

How does a citizen's age compare to his choice of energy strategy?

	Age					
	Under 20	20-29	30-39	40-49	50-60	60+
Nuclear	33.33%	10.39%	11.59%	14.40%	17.02%	18.92%
Conservation	0	32.47%	28.10%	20.80%	10.64%	12.16%

(Continued)

Age (Continued)

	Under 20	20-29	30-39	40-49	50-60	60+
Solar	0	23.38%	19.01%	19.20%	20.57%	16.22%
Coal	0	3.90%	9.92%	10.40%	19.15%	20.27%
MHD	33.33%	23.38%	27.77%	30.40%	31.21%	5.39%
No Response	33.33%	6.49%	4.13%	4.80%	.31%	8.78%

n=649

How does a citizen's household income compare to his choice of energy strategy?:

Income in $1,000

	0-5	5-10	10-15	15-20	20-25	25+
Nuclear	13.04%	9.0%	14.85%	19.53%	8.79%	18.82%
Conservation	23.91%	16.0%	22.22%	20.31%	18.68%	16.47%
Solar	17.39%	20.0%	22.92%	15.63%	21.98%	10.59%
Coal	21.74%	14.0%	11.11%	14.84%	9.89%	20.0%
MHD	13.04%	28.0%	24.31%	26.56%	40.0%	27.06%
No Response	10.87%	9.0%	4.86%	3.13%	0	7.06%

n=649

How does a citizen's role as an energy consumer compare to his choice of energy strategy?:

Primary Role as a Consumer of Energy

	Residential	Commercial	Agricultural
Nuclear	17.03%	3.23%	8.89%
Conservation	18.59%	29.03%	16.67%

(Continued)

Primary Role as a Consumer of Energy (Continued)

	Residential	Commercial	Agricultural
Solar	18.98%	9.68%	21.11%
Coal	14.09%	25.81%	13.33%
MHD	26.22%	29.03%	33.33%
No Response	5.09%	3.23%	6.67%

n=649

How does a citizen's reason for living in Montana compare to his choice of energy strategy?:

Reason Living in Montana

	Rural	Economics	Outdoors	Community
Nuclear	13.66%	17.06%	18.37%	9.52%
Conservation	21.80%	17.65%	22.04%	25.40%
Solar	18.31%	15.29%	19.59%	23.81%
Coal	12.21%	15.88%	9.39%	14.29%
MHD	28.49%	31.18%	26.53%	22.22%
No Response	5.52%	2.94%	4.08%	4.76%

n=649

SUMMARY AND CONCLUSIONS

The Montana Solar Questionnaire tapped a selected sample of citizens and legislators for their attitudes toward solar energy. Responses to the questionnaire reveal considerable interest in and support for solar energy in Montana.

A majority of those surveyed support the concept of state legislation to create incentives to promote solar energy development in the state.

Moreover, a majority of all respondents believe that the greatest obstacle to solar development is lack of information about solar. They feel the central strategy for overcoming this obstacle is public education. In particular, respondents demonstrated considerable support for an energy curriculum in the public schools to teach students about the present energy situation and solar energy potential for Montana. The citizens and legislators surveyed also supported implementation of vo-tech training in solar energy. This emphasis on education appears to reflect the respondents desire for a more thorough grounding in an endeavor they already support. However, the results of the questionnaire do not reveal what the specific content of public education about solar ought to be. Support for vo-tech training, for an energy curriculum in the public schools and for a handbook for information dissemination is merely support for public education vehicles. Further study is required to determine specific educational goals and programs. Moreover, agreement about specific educational programs will probably not be easily attained.

An overwhelming majority of respondents would consider installing a solar device in their homes; a far smaller number would favor a state energy policy committed to a transition to renewable energy sources. This pattern suggests a disparity between the respondents' concepts of personal as opposed to community

energy strategies. Although there is insufficient data to determine the exact nature of this disparity, conceivably, those who support solar development in Montana presently interpret solar energy as an adjunct to rather than a replacement for conventional energy systems. Similarly, the present level of understanding and support for solar energy indicates that the respondents see solar as appropriate for individual homes rather than as the core of a statewide energy system. Popular literature on solar energy emphasizes solar system technology and not solar energy policy and planning strategies. This emphasis could be the basis for the disparity between the strong willingness to apply solar to one's home and only limited support for a statewide renewable energy system. Moreover, many respondents may feel that while solar energy is feasible in the residential sector it is not feasible in the commercial and industrial sector.

As citizens around the state become increasingly aware of possibilities for solar energy, support for solar as a viable alternative to centralized conventional energy systems may grow. Clearly, a majority of respondents oppose a policy permitting Montana utility companies to levy special charges for those renewable energy users employing a conventional fuel backup system (e.g., electric baseboard heat).

The questionnaire results did reveal that the overwhelming majority of respondents find solar energy to be an attractive idea. Judging from their responses, citizens and legislators alike want to learn more about solar energy and they are entertaining the notion of applying solar energy in their homes. The time has certainly come to take steps not only to increase public awareness of solar energy, but, also, to facilitate the development of solar throughout the state. The public seems prepared to move and prepared to support state government efforts in the field of solar energy.

The responses to the Montana Solar Questionnaire suggest certain solar strategies which should be pursued in Montana:

1. Publish a Montana Solar Handbook for statewide distribution (the Montana Energy Office is currently preparing such a handbook for publication in the fall of 1978).

2. Implement an energy curriculum in the public school system.

3. Establish vo-tech training in solar energy.

4. Draft and submit legislation to create incentives for solar development. Legislation should include the following:

    a. Allow a tax credit for efficient, wood burning, air-tight stoves that consume about half the wood as the popular Franklin stove or typical fireplace.

    b. Increase the tax credit passed by Montana's 1977 Legislature for renewable solar energies from 10 percent to 25-55 percent as other western states have done.

    c. Allow a property tax exemption for solar installations.

    d. Appropriate funds to retrofit public buildings with solar equipment.

    e. Appropriate funds to install solar equipment on new or planned public buildings.

    f. Allow a tax credit for passive solar designs in new home construction (e.g., capturing the sun's rays to heat a home through south facing windows).

    g. Allocate a greater percentage of monies from Montana's coal severance tax to Montana's Renewable Energy Research, Development and Demonstration Program.

    h. Appropriate monies for agricultural uses of solar and wind power like electricity generation, grain drying, irrigation pumping, greenhouses, etc.

5. Fund a study to determine a viable state energy strategy which would consider the feasibility of a statewide energy system based on renewable energy sources.

6. Insure that no Montana utility adopt any rate policy which discriminates against a renewable energy user.

State of Montana
Office of The Lieutenant Governor

MONTANA ENERGY OFFICE
CAPITOL STATION
HELENA, MONTANA 59601
406-449-3940

THOMAS L. JUDGE
GOVERNOR

TED SCHWINDEN
LIEUTENANT GOVERNOR

January 20, 1978

Dear Fellow Montanan:

The State of Montana, through the efforts of the Montana Energy Office and the Solar Planning Committee, is developing a Montana plan for the optimum utilization of renewable energy. This solar plan will be a comprehensive treatment of alternative renewable energy available from sun, wind, water, biomass, wood and geothermal resources in Montana. This questionnaire has been mailed to Montana legislators and a randomly selected number of Montana citizens.

The information gathered from the questionnaires will reveal the level of interest in solar energy among the citizens of the state and the legislative options which are most desirable for the development of solar energy throughout the state. This information will, then, provide the basis for Montana's solar plan.

I can assure you that your responses will be held in confidence. Please complete the questionnaire and return in the enclosed stamped and self-addressed envelope at your earliest convenience.

Sincerely,

Ted Schwinden

TED SCHWINDEN
Lieutenant Governor

Enc.

MONTANA SOLAR STUDY

Please indicate if you: Stongly Agree (SA), Agree (A), No Opinion (N), Disagree (D), Strongly Disagree (SD), or Don't Know (DK), to the right of each of the following statements. *(The term solar energy means energy received from sun, wind, water, biomass, wood and geothermal resources.)*

1. Solar energy will pay for itself in the long term because it increases the value of the home and decreases the monthly utility rates. *(circle one)*	**SA**	**A**	**N**	**D**	**SD**	**DK**
2. You have to be an expert to install a solar system in your home. *(circle one)*	**SA**	**A**	**N**	**D**	**SD**	**DK**
3. It will be at least twenty years before this country will possess the technology to make solar energy feasible for home heating. *(circle one)*	**SA**	**A**	**N**	**D**	**SD**	**DK**
4. If we learn to use less energy, that doesn't necessarly mean that we will have to give up a lot of things that are dear to us. *(circle one)*	**SA**	**A**	**N**	**D**	**SD**	**DK**
5. Solar heated houses are unattractive and will not sell in today's housing market. *(circle one)*	**SA**	**A**	**N**	**D**	**SD**	**DK**
6. Our public schools should instruct students in solar energy and the present energy crisis. *(circle one)*	**SA**	**A**	**N**	**D**	**SD**	**DK**
7. Montana should implement vo-tech training in solar energy. *(circle one)*	**SA**	**A**	**N**	**D**	**SD**	**DK**

8. Please circle the appropriate number which you believe best reflects your knowledge about each type of solar system.

	very knowledgable				*no knowledge*
Active solar space heating	**1**	**2**	**3**	**4**	**5**
Passive solar space heating	**1**	**2**	**3**	**4**	**5**
Domestic solar water heating	**1**	**2**	**3**	**4**	**5**
Geothermal energy systems	**1**	**2**	**3**	**4**	**5**
Wind energy systems	**1**	**2**	**3**	**4**	**5**
Water energy systems	**1**	**2**	**3**	**4**	**5**
Biomass energy systems (e.g. methane production, wood, gasahol)	**1**	**2**	**3**	**4**	**5**

9. If I were to install a solar energy system it would include *(circle as many as are appropriate):*

a. passive solar space heating
b. active solar space heating
c. domestic solar water heating
d. geothermal system
e. wind system
f. water energy system
g. biomass energy system
h. don't know

10. If I were to install a heating system in my home today, I would install *(circle one of the following):*

a. electric baseboard heating
b. electric forced air furnace
c. natural gas furnace
d. heat pump
e. coal fired furnace
f. propane furnace
g. fuel oil furnace
h. renewable energy system (e.g. wind, solar, or biomass)
i. wood stove
j. don't know

11. In Montana we should concentrate our efforts developing the following solar options *(circle as many as you prefer).*

a. passive solar systems
b. domestic solar water heating systems
c. active solar space heating
d. geothermal systems
e. wind energy systems
f. biomass energy systems
g. wood stove
h. don't know

12. To meet future state energy needs, I favor the following strategy *(circle one)*

a. construction of nuclear power plants
b. a strong conservation program to reduce energy demand; phasing out existing coal and gas fired generating plants; and development of decentralized solar systems.
c. rapid development of solar systems with no more construction of coal fired generating plants
d. continued construction of coal fired generating plants with minimal development of solar energy systems.
e. development of alternative technologies such as coal gasification and magneto hydro dynamics (MHD)

13. Please indicate which of the following you believe to be the most important obstacle hindering the development of solar energy in Montana *(check one).*

_____ utility opposition to solar
_____ lack of information about the feasibility of solar energy in Montana
_____ cost of converting to solar
_____ solar technology is too experimental
_____ failure of state and local officials to support solar
_____ other (please specify) _____

_____

_____ don't know

14. Please indicate which of the following you believe is the most important factor which would facilitate the development of solar energy in Montana *(check one)*

_____ additional state solar legislation
_____ federal solar power legislation
_____ public education program about solar energy
_____ certification of solar products according to rigid engineering criteria
_____ more state and federal grants to individuals and citizen groups to develop and demonstrate various solar systems
_____ support for solar from the building trades and financial institutions

_____ other (please specify) _____
_____ don't know

Which of the following legislation options would you support at Montana's 1979 Legislature?

Please indicate if you: Strongly Agree (SA), Agree(A), No Opinion (N), Disagree (D), Strongly Disagree (SD), to the right of each of the following statements.

15. Allow a tax credit for efficient, wood burning, air tight stoves that consume about half the wood as the popular Franklin stove or typical fireplace. *(circle one)*	SA	A	N	D	SD
16. Increase the tax credit passed by Montana's 1977 Legislature for renewable solar energies from 10 percent to 25-55 percent as other western states have done. *(circle one)*	SA	A	N	D	SD
17. Allow a property tax exemption for solar installations. *(circle one)*	SA	A	N	D	SD
18. Appropriate funds to retrofit public public buildings with solar equipment. *(circle one)*	SA	A	N	D	SD
19. Appropriate funds to install solar equipment on new or planned public buildings *(circle one)*	SA	A	N	D	SD
20. Allow a tax credit for passive solar designs in new home construction (e.g., capturing the sun's rays to heat a home through south facing windows). *(circle one)*	SA	A	N	D	SD
21. Allocate a greater percentage of monies from Montana's coal severance tax to Montana's Renewable Energy Research, Development and Demonstration Program. *(circle one)*	SA	A	N	D	SD
22. Appropriate monies for agricultural uses of solar and wind power like electricity generation, grain drying, irrigation pumping, greenhouses, etc.. *(circle one)*	SA	A	N	D	SD
23. How would you react if a utility company charges a flat monthly rate for homes equipped with solar devices? *(circle one)*	SA	A	N	D	SD

24. Would a widely disseminated and well illustrated Montana Solar Directory with information for the person interested in solar be of use to you? *(circle one)*

Yes No No Opinion

25. Would you consider installing a solar device in your home sometime in the future? *(circle one)*

Yes No No Opinion

26. What is your age? *(circle one)*

Under 20 20-29 30-39 40-49 50-59 60+

27. Indicate the amount of schooling you have had. *(circle one)*

Grade school vo-tech high school some college college degree advanced degree

28. Do you live in (circle one):

City greater 10,000 Town 2,500-10,000 Town 1,000-2,500 Rural non-farm Rural farm

29. Indicate the category which best describes your primary role as a consumer of energy. *(circle one)*

Residential consumer Commercial consumer Agricultural consumer

30. Which company provides you with your source of power? *(circle one)*

Montana Power Company Montana-Dakota Utility Pacific Power & Light Rural Electric Association

31. Do you own/rent your home? *(circle one)*

32. Please indicate your gross annual household income. *(circle one)*

$0-5,000 5,000-10,000 10,000-15,000 15,000-20,000 20,000-25,000 over 25,000

33. What county do you reside in?_____

34. Are you male or female? _____

35. Please indicate the reason you choose to live in Montana.

_____ rural atmosphere
_____ economic opportunity
_____ outdoor recreational activities
_____ community involvement

36. In an attempt to facilitate the inventory of renewable energies devices in Montana, we request that you provide us with the name and location of any home or building that uses solar, wind, or biomass as an energy source.

_____

_____

_____

_____

_____

PUBLIC RESPONSE TO SOLAR STUDY
(649 Respondents)

	SA	A	N	D	SD	DK	No Answer
1.	187(28.8)	309(47.6)	32(4.9)	36(5.5)	6(.9)	68(10.5)	
2.	50(7.6)	153(23.5)	60(9.1)	248(38.2	38(5.9)	93(14.6)	7(1.1)
3.	32(4.9)	100(15.4)	52(8.0)	263(40.5)	130(21.0)	64(10.0)	8(1.2)
4.	149(23.0)	355(54.7)	16(2.5)	76(11.7)	22(3.4)	23(3.5)	8(2.2)
5.	16(2.5)	35(5.4)	51(7.9)	309(47.6)	169(26.0)	56(8.6)	13(2.0)
6.	299(46.1)	293(45.1)	20(3.1)	14(2.2)	8(1.2)	6(.9)	9(1.4)
7.	211(32.5)	306(47.1)	55(8.5)	30(4.6)	13(2.0)	18(2.8)	16(2.5)

8. Knowledgeable	1	2	3	4	5 Unknowledgeable	No Answer
Active	21(3.2)	50(7.7)	139(21.4)	168(25.9)	211(32.5)	60(9.2)
Passive	21(3.2)	46(7.1)	117(18.0)	160(24.7)	241(37.1)	64(9.9)
Domestic	31(4.8)	95(14.6)	183(28.2)	145(22.3)	136(21.0)	59(9.1)
Geothermal	25(3.9)	59(9.1)	155(23.9)	160(24.7)	187(28.8)	63(9.7)
Wind	48(7.4)	133(20.5)	205(31.6)	103(15.9)	108(16.6)	52(8.0)
Water	41(6.3)	124(19.1)	186(28.7)	126(19.4)	113(17.4)	59(9.1)
Biomass	44(6.8)	100(15.4)	126(19.4)	140(21.6)	169(26.0)	70(10.8)

9. Passive	Active	Domestic	Geothermal	Wind	Water	Biomass	Don't Know
107(16.5)	175(27.0)	277(42.7)	45(6.9)	164(25.3)	68(10.5)	104(16.0)	210(32.7)

10. Baseboard	Electric Air	Gas	Heat Pump	Coal	Oil	Renewable	Wood	Propane	No Answer
93(14.3)	19(2.9)	122(18.8)	66(10.2)	44(6.8)	28(4.3)	97(14.9)	91(14.1)	11(1.7)	78(12.0)

11. Passive	Active	Domestic	Geothermal	Wind	Biomass	Wood	Don't Know
169(26.1)	282(43.5)	313(48.3)	207(31.9)	381(58.7)	175(27.0)	155(23.9)	101(15.6)

12. Nuclear	Conservation	Solar	Coal	MHD	No Answer
98(15.1)	121(18.6)	121(18.6)	93(14.3)	174(26.8)	42(6.5)

13. Utility Opposition	Information	Cost	Experimental	Officials	Other	No Answer
99(15.3)	250(38.8)	141(21.9)	49(7.6)	0	29(4.5)	52(8.1)

	Legislation State	Legislation Federal	P.E. Program	Certification	Grants	Trades	Other	No Answer
14.	24(3.8)	36(5.7)	276(43.5)	33(5.2)	99(15.6)	70(11.0)	27(4.3)	69(10.9

	SA	A	N	D	SD	No Answer
15.	120(18.5)	221(34.1)	82(12.6)	132(20.3)	49(7.6)	45(6.9)
16.	156(24.0)	272(41.9)	98(15.1)	60(9.2)	23(3.5)	40(6.2)
17.	159(24.5)	276(42.5)	74(11.4)	73(11.2)	30(4.6)	37(5.7)
18.	50(7.7)	199(30.7)	151(23.3)	154(23.7)	47(7.2)	48(7.4)
19.	111(17.1)	342(52.7)	76(11.7)	52(8.0)	27(4.2)	41(6.3)
20.	91(14.0)	299(46.1)	94(14.5)	96(14.8)	31(4.8)	38(5.9)
21.	148(22.8)	301(46.4)	101(15.6)	42(6.5)	20(3.1)	37(5.7)
22.	111(17.1)	264(40.7)	93(14.3)	108(16.6)	34(5.2)	39(6.0)
23.	21(3.2)	98(15.1)	122(18.9)	175(27.0)	203(31.4)	28(4.3)

	Yes	No	No Opinion
24.	454(70.1)	145(22.4)	49(7.6)

	Yes	No	No Opinion	No Answer
25.	473(73.0)	123(19.0)	4(.6)	48(7.4)

	Under 20	20-29	30-39	40-49	50-59	60+	No Answer
26.	6(.9)	77(11.9)	121(18.6)	125(19.3)	141(21.7)	148(22.8)	31(4.8)

	Grade	Vo Tech	High School	Some College	College Degree	Advanced Degree	No Answer
27.	63(9.7)	12(1.8)	219(33.7)	161(24.8)	107(16.5)	66(10.2)	21(3.2)

	City	10,000-2,500	2,500-1,000	Rural Non Farm	Rural Farm	No Answer
28.	255(39.4)	106(16.4)	50(7.7)	101(15.6)	120(18.5)	16(2.5)

	Residential	Commercial	Agricultural	No Answer
29.	511(78.7)	31(4.8)	90(13.9)	17(2.6)

	MPC	MDU	PP&L	REA	No Answer
30.	428(66.0)	61(9.4)	21(3.2)	110(17.0)	28(4.3)

	Own	Rent	No Answer
31.	547(84.9)	63(9.8)	34(5.3)

	0-5,000	5,000-10,000	10,000-15,000	15,000-20,000	20,000-25,000	25,000+	No Answer
32.	46(7.1)	100(15.4)	144(22.2)	128(19.7)	91(14.0)	85(13.1)	55(8.5)

33. See Print Out

34.

Male	Female	No Answer
513(79.4)	107(16.6)	26(4.0)

35.

Rural	Opportunity	Outdoor	Community
344(53.1)	170(26.2)	245(37.8)	63(9.7)

LEGISLATORS' RESPONSES TO SOLAR STUDY
(65 Respondents)

	SA	A	N	D	SD	DK
1.	18(27.7)	25(38.5)	4(6.2)	8(12.3)	4(6.2)	6(9.2)
2.	2(3.1)	15(23.1)	7(10.8)	34(52.3)	2(3.0)	5(7.7)
3.	5(7.7)	11(16.9)	4(6.2)	28(43.1)	14(21.5)	3(4.6)
4.	21(32.3)	34(52.3)	2(3.1)	6(9.2)	1(1.5)	1(2.5)
5.	0(0)	3(4.6)	6(9.2)	30(46.2)	20(30.8)	6(9.2)
6.	26(40.0)	32(49.2)	2(3.1)	1(1.5)	1(1.5)	1(1.5)
7	14(21.5)	35(53.8)	4(6.2)	5(7.7)	5(7.7)	2(3.1)

	Knowledgeable			Unknowledgeable		No Answer
8.	1	2	3	4	5	
Active	8(12.3)	9(13.8)	16(24.6)	20(30.8)	12(18.5)	
Passive	6(9.2)	12(18.5)	16(24.6)	19(29.2)	12(18.5)	
Domestic	7(10.8)	16(24.6)	19(29.2)	18(27.7)	5(7.7)	
Geothermal	3(4.6)	13(20.0)	13(20.0)	22(33.8)	14(21.5)	
Wind	3(4.6)	15(23.1)	20(30.8)	21(32.3)	5(7.7)	1(1.5)
Water	6(9.2)	17(26.2)	23(35.4)	13(20.0)	6(9.2)	
Biomass	4(6.2)	6(9.2)	22(33.8)	23(35.4)	8(12.3)	2(3.1)

9. Passive	Active	Domestic	Geothermal	Wind	Water	Biomass	Don't Know
23(35.4)	25(38.5)	35(53.8)	2(3.1)	13(20.0)	9(13.8)	8(12.3)	15(23.1)

10. Baseboard	Electric Air	Gas	Heat Pump	Coal	Oil	Renewable	Wood	Propane	No Answer
13(20.0)	3(4.6)	17(26.2)	8(12.3)	5(7.7)	3(4.6)	8(12.3)	4(6.2)	0	4(6.2)

11. Passive	Active	Domestic	Geothermal	Wind	Biomass	Wood	Don't Know
31(47.7)	31(47.7)	42(64.6)	18(27.7)	41(63.1)	17(26.2)	23(35.4)	8(12.3)

12. Nuclear	Conservation	Solar	Coal	MHD	No Answer
11(16.	17(26.2)	6(9.2)	9(13.8)	20(30.8)	2(3.1)

13. Utility Opposition	Information	Cost	Experimental	Officials	Other	No Answer
5(7.7)	28(43.1)	20(30.8)	9(13.8)	1(1.5)	1(1.5)	1(1.5)

	Legislation State	Legislation Federal	P.E. Program	Certification	Grants	Trades	Other	No Answer
14.	6(9.2)	5(7.7)	25(38.5)	3(4.6)	11(16.9)	8(12.3)	5(7.7)	2(3.1)

	SA	A	N	D	SD	No Answer
15.	9(13.8)	22(33.8)	8(12.3)	15(23.1)	8(12.3)	3(4.6)
16.	12(18.5)	26(40.0)	9(13.8)	14(21.5)	3(4.6)	1(1.5)
17.	13(20.0)	24(36.9)	13(20.0)	10(15.4)	2(3.1)	3(4.6)
18.	7(10.8)	12(18.5)	18(27.7)	16(24.6)	5(7.7)	7(10.8)
19.	10(15.4)	30(46.2)	13(20.0)	7(10.8)	3(4.6)	2(3.1)
20.	5(7.7)	27(41.5)	11(16.9)	16(24.6)	3(4.6)	3(4.6)
21.	8(12.3)	27(41.5)	17(26.2)	8(12.3)	4(6.2)	1(1.5)
22.	10(15.4)	22(33.8)	20(30.8)	9(13.8)	2(3.1)	2(3.1)
23.	4(6.2)	12(18.5)	20(30.8)	16(24.6)	10(15.4)	3(4.6)

	Yes	No	No Opinion
24.	53(81.5)	9(13.8)	3(4.6)
25.	42(64.6)	13(20.0)	10(15.4)

	Under 20	20-29	30-39	40-49	50-59	60+
26.	0	2(3.1)	12(18.5)	13(20.0)	17(26.2)	21(32.3)

	Grade	Vo Tech	High School	Some College	College Degree	Adv. Degree	No Ans.
27.	2(3.1)	0	7(10.8)	19(29.2)	25(38.5)	11(16.9)	1(1.5)

	City	2500-10,000	1000-3500	Non Farm	Rural Farm
28.	26(40.0)	11(16.9)	3(4.6)	9(13.8)	16(24.6)

	Residential	Commercial	Agricultural	No Answer
29.	44(67.7)	5(7.7)	15(23.1)	1(1.5)

	MPL	MDU	PP&L	REA	No Answer
30.	43(66.2)	4(6.2)	4(6.2)	13(20.0)	1(1.5)

	Own	Rent	No Answer
31.	63(96.9)	0	2(3.1)

	0-5,000	5,000-10,000	10,000-15,000	15,000-20,000	20,000-25,000	25,000+	No Answer
32.	0	5(7.7)	15(23.1)	10(15.4)	5(7.7)	27(41.5)	3(4.6)

33. See Print-Out

34.

Male	Female	No Answer
54(83.1)	8(12.3)	3(4.6)

35.

Rural	Opportunity	Outdoor	Community
37(56.9)	23(35.4)	29(44.6)	25(38.5)

PROPOSED PROJECTS SUBMITTED TO SOLAR PLANNING OFFICE-WEST

SECTION H

Projects by Programs

A. State Solar Committee Program

- A.1 State Solar Committee
- A.2 Solar Networking
- A.3 Workshop for Professional Groups
- A.4 Solar Media Information
- A.5 Collect Solar Hardware Information

B. Information Dissemination

- B.1 Information Sharing From Montana's Renewable Alternative Energy Program
- B.2 Solar Handbook
- B.3 Renewable Energy Traveling Road Show
- B.4 Solar Retrofit

C. Training

- C.1 Solar Technician Training
- C.2 Government Employee Solar Training Program
- C.3 Prisoner Solar Panel Construction for Public Buildings

D. Education

- D.1 Solar Curricula for Grades K-12
- D.2 Teachers' Solar Educational Workshop, Grades K-12

E. Research

- E.1 Wind Monitoring
- E.2 Aid to Solar Innovators
- E.3 Small Scale Hydro Development
- E.4 Wind/Solar Community/Farm Development in Rural Areas
- E.5 Wood Utilization and Impacts

Project Summary

Priority		Projects	Project Duration	Annual Cost Montana	Number of Western SUN States Involved	Annual Cost Region[1]
1.	A.1	State Solar Committees	5 years	28,850	All 13	562,575
2.	A.2	Solar Networking	3 years	21,100	All 13	411,450
3.	A.3	Workshops for Professional Groups [2]	2 years	26,590	All 13	518,505
4.	B.1	Information Sharing From Montana's Renewable Alternative Energy Program	ongoing	40,000	All 13	40,000
5.	B.2	Solar Handbook	ongoing	34,400	All 13	670,800
6.	B.3	Renewable Energy Traveling Show	ongoing	41,450	All 13	808,175
7.	D.1	Solar Curricula for Grades K-12	1 year	----	All 13	75,000
8.	A.4	Solar Media Information	ongoing	22,600	All 13	490,700
9.	A.5	Collect Solar Hardware Information	ongoing	32,960	All 13	542,720
10.	C.1	Solar Technician Training	3 years	35,000	All 13	782,500
11.	D.2	Teachers' Solar Educational Workshops, K-12	5 years	23,960	All 13	467,200
12.	B.4	Solar Retrofit Manual	1 year	42,450	All 13	297,200
13.	C.2	Government Employee Solar Training Program	ongoing	48,000	All 13	799,900
14.	E.1	Wind Monitoring	3 years	----	9	63,200
15.	E.2	Aid to Solar Innovators	ongoing	----	All 13	500,000
16.	C.3	Prisoner's Solar Panel Construction for Public Buildings	ongoing	----	All 13	To be Determined
17.	E.3	Small Scale Hydro Development	2 years		Most	950,000
18.	E.4	Wind/Solar Community Farms	ongoing	82,000	All 13	1,634,000
19.	E.5	Wood Utilization and Impact	1 year	4,810	7	162,170

1/ Regional costs in several cases were derived from a coefficient of 19.5 times Montana's costs taking into consideration such factors as population, geography, state size, etc.

2/ If projects A.1, A.2 and A.3 were funded; and since each of these projects involve an active state solar committee; then most probably through a coordinated effort one FTE could be deleted from the combined budget amounting to an estimated savings of $13,500 for Montana and $263,250 for the region.

A.1 State Solar Committees

Description

Each state in the Western Region has brought together for its initial solar planning effort individuals representing various segments of the state's population to form either a Solar Advisory Group (SAG) or -- as in the case of Montana -- a Solar Planning Committee (SPC). These groups have played a key role in the formulation of program recommendations and in the initiation of data gathering programs and information workshops preliminary to the establishment of solar planning programs.

Rather than terminate its duties in March of 1978 in conjunction with the submission of the final solar plans, we propose that each group assume at that time the new title of State Solar Committee. This committee would continue to meet regularly and perform vital basic functions necessary to a coordinated effort: it would develop strategies, projects and programs based on members' combined knowledge, experience and wisdom; it would oversee and provide guidance to existing programs and projects; and it would communicate and coordinate -- through state field representatives of the Western Sun -- with other state programs in the region. Most importantly, it would continue to assess and analyze the ever-changing solar needs of the state and region as an ongoing planning effort.

Each solar committee will employ a staff person to coordinate its activities with state energy offices and the Field Representative.

Rationale

The existence of an active, diversified and experienced advisory group is necessary to any well-coordinated state/regional research, education, development and commercialization program. Since our regional solar effort necessi-

tates education programs as varied as are the people, activities and energy requirements to which it is directed, it must depend for its success on advice and ideas from people representing the full range of experience and endeavour of these people. Thus, librarians, citizens' groups, public employees, and students must be involved, as well as designers, builders, engineers and researchers. These, in turn, will mobilize their respective constituencies into a viable solar force.

To date, the SAGs/SPCs in each state have fulfilled competently this function. They have gone through the initial "breaking-in" period, have become acquainted with the parameters of the problems and possibilities involved in the state and regional planning process, and members of these groups have become acquainted with each other and familiar with the potential and contributions of each of the solar efforts. Assuming the need for an advisory group, and further assuming the necessity that this group be representative of the people toward whom the program is directed, we propose that the Solar Committee be composed of state's present SPC or SAG, with minor changes in its membership as deemed appropriate by the present group.

We feel that in this way each state -- and the region -- will be insured of a continued solar planning effort in the state and the region and a smooth and relatively painless transition from the initial planning process to the implementation of its first solar development programs, and will avoid unnecessary effort and delays.

Priority and Why

Montana gives this program the highest priority; we feel that it is the essential first step toward a transition from planning to implementation of the solar effort.

Deterrents and Incentives

SAG/SPCs, with their broad range of representation, have begun the process of determining and addressing deterrents and incentives to solar energy development in each state. Solar Committees, with the same representation, will naturally continue this process.

States Which Should Be Involved

Every state in the Western Region should implement this program.

Approach

Explained above.

Relationship To Similar Projects Being Conducted By Others

We know of no similar efforts by others in the area of state solar development planning; however, Montana has a 5-member citizen advisory committee which helps evaluate proposals for state funding under its Renewable Alternative Energy Grants Program. Experience with this group gives weight to our support for the proposed State Solar Committees.

Feedback Required to Evaluate Results

The success or failure of the Solar Committees' efforts will be made obvious by the degree of ease and thoroughness with which each state: 1) makes the transition from plan to implementation of solar programs; 2) coordinates between various instate solar projects; and 3) coordinates its efforts with those of the rest of the region.

Schedule

The foundation has been established; the startup could begin as soon as

the regional solar plan has been determined.

Projected Annual Cost Estimates

	Montana	Region
A. Personnel (FTE 1.25)	$15,000	$292,500
B. Fringe Benefits (14% of Personnel Costs)	2,100	40,950
C. Travel	4,500	87,750
D. Equipment	250	4,875
E. Supplies	1,500	29,250
F. Subcontracts	5,000	97,500
G. Others	500	9,750
TOTAL	$28,850	$562,575

H. State Contributions: Office Space

Project Duration

5 years

A.2 Solar Networking

Description

Many organizations, groups and agencies in each western state are already involved with solar energy projects or programs. The Networking Program is designed to do four things: 1) Identify present and intended solar projects, programs, capabilities of each group in the state. 2) Bring to each group an awareness of just what the others are doing, can do, and intend to do in the area of solar energy. 3) Become familiar (aided by the state Field Representative of Western SUN) with solar projects and information sources in the western region and the nation. 4) "Network" information amongst the various groups: aided by the Town Energy Coordinators (see Roadshow Program), libraries, and Special Interest Networkers (see Workshops Program); solar networking program staff will keep each group informed of the solar activities of other groups in the state and region and aid and encourage sharing of information and expertise. The staff will also work with the state energy office toward creation of a state energy extension service.

Rationale

A major problem with solar energy development to date has been the wasted time, energy and money which result from lack of communication between the multitude of groups and agencies pursuing solar and solar-related programs and projects. By alleviating this problem through a well coordinated networking effort, we expect to avoid duplications, frustrations and needless expense; this will encourage and speed up the development process. In essence, a solar infrastructure would be developed.

Priority and Why

This program is second on Montana's list of priorities; we feel, as stated earlier, that a strong network tying together information and development organizations and agencies is crucial to the solar effort. A well-coordinated network saves time, energy, and money -- none of which we can afford to waste.

Deterrents and Incentives

a. Deterrents: As we stated above, we feel that lack of communication and cooperation is one of the strongest deterrents to rapid solar energy development. In the few cases we have observed where networking has taken place, education and development have progressed far more rapidly than elsewhere.

b. Incentives: One of the most effective incentives to action and enthusiasm in research, development and demonstration is a program which keeps groups in touch with each other -- one that prevents the feeling on the part of the group that it is working in a vacuum. Exchange of ideas, problems, successes -- all help immensely to keep energy flowing and to deter frustrating duplication of effort.

States To Be Involved

Every state in the Western Region should develop a coordinated internal solar network in conjunction with the State Solar Committee, and should network somewhat more loosely with the other states in the region through the Western SUN.

Approach To Be Used

The Networking Staff should first identify by means of consultation and questionnaires each group in the state which is dealing in any way with renewable energy programs or projects. Details on each group's projects and capabilities should be filed. The staff should consult with the Field Representative on projects in other states which are similar to those in the parent state or

which might be of special interest and should therefore be coordinated by some or all the states. These should be filed.

When this basic information compilation job is completed, a steady monitoring job becomes the main focus. Regular contact with each group is essential, so that the staff can refer groups with similar projects to each other and bring those with problems into contact with those offering possible solutions. Identification of new groups and projects is at the same time important. The program staff will have specified people in the state whose job it is to aid them: Town Coordinators, the Field Representative, the Special Interest Networkers (see Workshop Program), and eventually the Energy Extension Service.

It should be emphasized that successful networking is ultimately reliant not on the efforts of a small staff alone; one of the most important reasons that networking can be energy-efficient is its multiplying effect: after the initial contacts and references, groups tend to keep in contact with others of similar interest, and to identify and become familiar with others they draw into the network. It's a cooperative process, but it does have to be coordinated and sustained; and that is the responsibility of this program and staff.

Relationship to Similar Projects Being Conducted By Others

We don't know of any similar projects being conducted by others.

Type Of Organization Which Should Perform Work

This program should be performed by the state's Solar Committee's Staff Coordinator, with the aid of the SPC, town coordinators, Field Representative of Western SUN, special interest networkers, and energy extension service.

Potential Impact On Solar Use

Difficult to assess.

Feedback Required

A coordinated and smooth state solar planning effort, with good coordination with the rest of the Western Region, will be an indication of a good networking program.

Schedule

The Networking Program could start as soon as the State Solar Committee is established, and the staff chosen.

Projected Annual Cost Estimates

	Montana	Region
A. Personnel (FTE 1.25)	$15,000	$292,500
B. Fringe Benefits (14% of Personnel Costs)	2,100	40,950
C. Travel	1,500	29,250
D. Equipment	250	4,875
E. Supplies	1,000	19,500
F. Subcontracts	500	9,750
G. Others	750	14,625
TOTAL	$21,100	$411,450

H. State Contribution: Ofice Space

Project Duration

3 years

A. 3 Workshops for Professional Groups

Description

Each state will sponsor a series of workshops for vaious professional and special-interest groups (financiers, designers, builders, teachers, utilities, etc.) Each workshop will address deterrents and incentives to solar energy development as viewed from the standpoint of a particular group and will give members of the group an opportunity to discuss with their peers the problems they've encountered, opportunities they've identified etc. At the same time, the workshop will enable the State Solar Committee to disseminate to members of the group general solar information and news with which they might not yet be familiar.

Rationale

Montana feels that workshops are essential to the establishment of the infrastructure which will eventually develop and commercialize solar devices and systems in the state. Professionals must learn necessary solar information in relation to their work, and one of the best ways to begin this process is through peer group discussion and information transfer.

Transcribed proceedings of workshops will be an invaluable aid to other groups with similar problems and/or questions.

Priority and Why

Montana has give this program third priority on our list. It is extremely important that professional and special interest groups which will have important roles to play in the development of solar energy begin to familiarize themselves with solar options. Without the aid of these groups, the entire development effort is doomed to failure.

Deterrents and Incentives

A major focus of each workshop would be the identification of, and discussion about, various deterrents and incentives to solar energy development from the standpoint of the particular group.

States To Be Involved

Each state in the Western Region should identify the groups in that state which would benefit from workshops. States should share results and conclusions of proceedings from the workshops.

Approach To Be Used

The State Solar Committee will identify groups which would benefit by workshops, and determine the priority by which to establish a schedule for these workshops. In each workshop:

1) Presentations will be given by those knowledgeable in the specific area. These will focus on deterrents and incentives, and will discuss first-hand experiences with solar projects, systems.

2) Participants will divide into small work groups for discussion of specific topics.

3) Plenty of appropriate and up-to-date solar information will be on hand for participants to peruse. This will include both information specifically relevant to the particular group and general solar information.

4) All sessions will be recorded, and resulting proceedings distributed both to participants and to other interested parties.

5) A person will be identified who is willing to act as "networker" for that group. This person will keep him/herself informed (with the aid of the Solar Networker) about new solar developments of particular interest to that

professional group, and will network information and news with the corresponding special interest solar networkers from other states in the Western Region.

6) Two workshops will be held for each group; in the several month interval between workshops, the problems and questions which could not be solved or answered in the first will be addressed by the Solar Committee and the Special Interest Networkers, so that the group can benefit from their results in the second workshop.

7) Questionnaires will be handed out at the conclusion of each workshop so that the participants can evaluate the workshop.

Relationship To Similar Projects Being Conducted By Others

Montana's SPC sponsored a very successful workshop in early November, 1977, for financiers and assessors; we feel that it is a potential model in format for future professional group workshops.

Type Of Organization To Perform Work

The workshops should be organized by the full-time person working for the State Solar Committee. This person should be aided if necessary by a half-time staff person provided by the State Energy Office. State Solar Committee members with connection to or association with workshop target should provide as much assistance as possible.

Potential Impact

Difficult to assess. Workshops have the potential of impacting a large number of professional people (one workshop a month in each state would mean 312 by 1985, with a possible exposure of 27,000 people). Whether or not exposure would lead to action is dependent on too many factors to allow assessment at this time.

Feedback

Questionnaires sent to participants of workshops will provide the feedback required to evaluate each workshop.

Starting Date

Workshops can begin as soon as a State Solar Committee has decided which groups to target and has ranked them in order of preference.

Projected Annual Cost Estimates

		Montana	Region
A.	Personnel (FTE 1.5)	$16,000	$312,000
B.	Fringe Benefits (14% of Personnel Costs)	2,240	43,000
C.	Travel	2,250	48,750
D.	Equipment	250	4,875
E.	Supplies	2,100	40,950
F.	Subcontracts	3,000	58,500
G.	Others	500	9,750
	TOTAL	$26,590	$518,505

H. State Contributions: Office Space

Project Duration

Two years

Note: If Projects A.1, A.2, and A.3 were funded, and since each of these projects involves an active State Solar Committee, then most probably through a coordinated effort one FTE could be deleted from the combined budget amounting to an estimated savings of $13,500 for Montana and $263,250 for the Region.

B.1 Information Sharing from Montana Renewable Alternative Energy Research Development and Demonstration Programs

Description

Solar "renewable energy" projects which have been funded for the past three years under Montana's Renewable Alternative Energy Grants Program will be assessed thoroughly. The information obtained will be published and distributed throughout the state and region. Other states will provide feedback by way of comparison with similar projects ot their own, suggestions, criticisms, etc. Original data, feedback, and updated information will be compiled in a publication.

Rationale

Montana's Renewable Energy Grants Program, established in 1975, is the oldest coordinated state small grants program for solar energy in the Western Region. The state has expended nearly one million dollars annually in small solar grants to citizens; it has funded 110 projects for sums ranging from $600 to $100,000. The projects include both educational programs and solar, wind, biomass, geothermal and small-scale hydro research, development and demonstration projects. A detailed assessment of these projects focusing on efficiencies, cost-effectiveness, problems, successes, changes in design, etc., would contribute immensely to the body of knowledge of solar system performance in Montana; distributed throughout the region, this documentation can become the basis for thorough discussion and analysis of various types of solar systems in the different bioregions and microclimates of the Western Region.

Priority and Why

This program has fourth priority on our list. Many solar projects exist in every state, but they aren't coordinated in any way; we feel that a major advan-

tage in using Montana's grants program is that it represents an organized effort, and as such can be monitored systematically to provide integrated and coordinated data. This is extremely important, and we feel that it provides an unequaled opportunity for forming a basis for establishing the credibility and feasibility of various solar energy systems in the region. With the allocation of a relatively small amount of funds, compared to the size of the ongoing solar program, a wealth of information will be available for broad dissemination through the region.

Deterrents and Incentives Addressed

Among the deterrents to solar energy development which will be addressed by this project are:

1. Technical uncertainties of solar energy systems.
2. Lack of reliable performance information for lending institutions.
3. Insufficient information for homeowners considering the use of solar energy.
4. Lack of a cohesive information interchange system between the various groups involved with solar energy development throughout the region.

States Which Should Be Involved

The results of the information-sharing effort should be of interest to many groups and individuals throughout the region. However, to achieve the greatest utilization of information, the focus of information exchange should be those states with energy problems and solar energy resources similar to those of Montana.

Approach to Be Used

Projects funded by Montana's Renewable Energy Program will be evaluated

by several methods:

1) Each grantee will undertake a self-monitoring effort. At several states in the development of the project the grantee will evaluate progress, detail problems, describe changes in design, etc.

2) In concert with the self-evaluation process, projects will undergo a detailed engineering evaluation. At first, as this process is being tested and perfected, a selection of projects will be chosen for the analysis by program engineers. This selection will include examples of various types of systems. When the engineering evaluation processes for various types of system are established and running smoothly, we expect to conduct a thorough evaluation of every project funded.

Reports of the results of the project description/evaluations will be made available for distribution to the groups participating in the regional information sharing program.

Relationship to Similar Projects Being conducted By Others

We know of no other coordinated state grants program in the Western Region, but there exist many solar projects which are being evaluated and monitored. We will gear our evaluation methods as much as possible to coordinate with those used by other credible evaluation groups and agencies for ease in transfer of information.

Type of Organization Which Should Perform Work

The evaluation portion of the project must be coordinated by the state department (Montana Department of Natural Resources and Conservation) administering the Montana Renewable Alternative Energy Grants Program. Installation of each renewable energy system will be undertaken by the grantee. A professional contractor will undertake the engineering evaluation. Preparation and dissemin-

More alternative energy grants

And God said, "Let there be light." And there was light.

That was some time ago. Now the Fort Benton United Methodist Church is turning to creation for a source of warmth for its building.

The Montana Department of Natural Resources has awarded a $9,380 grant to the Fort Benton congregation for a solar space heating project.

The grant was among 31 awards for alternative energy development and demonstration projects totaling $322,389.

While most of the previous grantees were private individuals, this third batch included a considerable number of public entities and research organizations.

The department also set aside another $56,000 for its own use in a solar home monitoring program and a study of the feasibility of making ethyl alcohol (ethanol) from grain.

The Fort Benton grant will be used for a 2,000-square-foot liquid, trickle-type solar collector system. The church will also upgrade its building insulation.

THE HISTORIC Fargo Hotel in Billings will get some space-age refurbishing with a $12,500 grant for a solar heating project. Applicant Phil Morrow had requested $17,400, but the department deleted part of his request for money to install an absorbtion water chiller air conditioning system.

"It is not the policy of this program to promote the use of such heavy energy-using devices as air conditioners," the department said.

The largest single grant — $50,000 — went to John Robbins and David Ward, scientists at Montana State University, who requested $78,963 for research into creation of methane gas and fertilizer from organic wastes.

The smallest grant was $616 for James Orvis of Bozeman for a solar greenhouse.

A $25,000 grant was given to Charles Fowlkes of Bozeman for project to compare two methods of solar heating for mobile homes. Fowlkes, who holds a doctorate in engineering mechanics, also received a $35,490 grant for a solar monitoring project involving 30 stations at selected high schools throughout Montana. Students will be involved in the solar radiation measuring project.

John Badgley of the Institute of the Rockies in Missoula received $3,675 for a project involving a wood-heated underground conference center in Missoula.

The city of Shelby received $36,800 for a solar heated swimming pool which can be used year-round.

Mountainview Memorial Hospital in White Sulphur Springs will use a $2,000 grant for a geothermal water heating project.

RICHARD KLINGER, a Helena lawyer and member of the state Environmental Quality Council, was given $10,000 for a study of renewable energy development legislation and regulation.

A Helena-based group known as AERO (Alternative Energy Resources Organization) received $24,800 for a year-round renewable energy demonstration center for the New Western Energy Show — a public education program.

The Office of the State Superintendent of Public Instruction was given $3,000 for an energy environment simulator — a computer by which an operator controls a resource and its use, trying to meet the lifestyle demanded by a given population under the restraint of environmental compatibility on a preset time scale.

ation of reports will be the responsibility of the Department of Natural Resources and Conservation coordinating with the State Solar Committee, the staff of the Networking Program, and the Field Representative.

Potential Impact

The project has strong potential for demonstrating solar potential in a coordinated fashion, and for broadening knowledge about specific solar systems. Coordinated information is always more convincing and effective and useful than are scattered demonstrations, so the impact could be very strong.

Feedback Required to Evaluate Results

Feedback will come in the form of reports and evaluations from the grantee plus reactions to the information from other states in the region. This feedback will help guide the state in determining ways to improve evaluations, and in deciding what new projects to fund in the state.

Schedule

Projects from which the information is to be generated are funded by an ongoing program; the plan proposed here should likewise be ongoing. The first renewable energy projects funded through Montana's Renewable Energy Program are nearing completion. A certain amount of preliminary data, based upon the closing reports for the projects involved, will be available soon and may suit interim informational needs. The most essential information will result from the past-installation monitoring effort and it is therefore imperative that the necessary evaluation begin soon. The evaluation design will be completed shortly and subsequently utilized in test studies of a limited number of projects during the present heating season. On the basis of this work the evaluation process will be refined and finalized. It is anticipated that by next year a full-scale, ongoing

evaluation program will be under way.

Projected Cost Estimate

The State of Montana has committed nearly $40,000 to the system evaluation/ information transfer effort. This first-year funding will support development of the evaluation scheme and transferring all available information to the public. Once the process is established, substantially more funding will be sought for the full-scale, program-wide work; the necessary funding may be double to triple the amount presently available. If the information generated is to be made available on a timely basis throughout the region, funding support approximately equal to the state contribution will be necessary.

	Western Sun's Contribution	Montana's Contribution
1977		$40,000
1978	$40,000	40,000
1979	60,000	60,000 1/
1980	80,000	80,000

Project Duration: On going. Financial arrangements with Western SUN can be negotiated on a year to year basis.

1/ Montana's contributions for 1979 and 1980 are a hopeful guess at best.

B.2 Solar Handbook

Description

The Solar Handbook will bring together in one document the most important basic information and the most useful reference material on solar energy for the state. The handbook will be a source book, not a cookbook; it will be comprehensive, tabulated, indexed and well illustrated, and will include (but not be limited to) the following subjects:

1. An explanation of each major form of solar energy, with diagrams of typical systems.
2. A description of energy conservation measures.
3. Climatological data.
4. Energy audits.
5. A list of individuals and groups in the state with expertise and experience in the development of solar devices and systems and who are willing to provide information and/or services to the public.
6. Retrofit information.
7. A list of local manufactureres, distributors, retailers and products (not necessarily an endorsement).
8. An explanation of the economics involved in solar energy systems, with an explanation of life cycle costing.
9. A list of state and federal legislative incentives.
10. A list of suggested solar development incentives.
11. A list of financial institutions within the state willing to make loans for buildings utilizing solar energy.
12. A list of local, state, regional and national solar programs.
13. A short discussion of known barriers to solar development in the state.
14. A short discussion of the utility/solar interface.
15. A list of existing solar facilities in the state with photos

or illustrations.

16. A complete annotated bibliography, with a recommended publication list.
17. A glossary of solar terms.
18. The state solar plan.

Rationale

A single comprehensive reference document is a necessary tool for a coordinated development effort. Those who are uninformed or misinformed about the feasibility of solar development need access to dependable information, and those who are currently involved in the solar effort must keep abreast of changes as they occur. We feel that solar energy must be developed by non-centralized energy network, and therefore basic information must be distributed widely; the Solar Handbook will aid enormously in this information distribution, and we feel that it will be a more effective and less costly initial information dissemination project than would a solar clearinghouse.

Priority and Why

The handbook is fifth on our list of priorites. Having already published (in March of 1977) a Renewable Energy Handbook for the state, we know through experience how handy and useful such a document will be. Montana's Solar Planning Committee is already assembling information for the state's Solar Handbook, and hopes by March to have the first draft completed.

Deterrents and Incentives Addressed

Two major deterrents to the development of solar energy are people's lack of information and their lack of reference to or contact with those who can help with problems. This handbook will speak to both since it contains basic information and, perhaps more importantly, lists of good references to people and places with further information.

States Which Should Be Involved

Each state should compile its own handbook.

Approach to be Used

The handbook will be written to attract and hold the interest of those who know nothing or very little about solar energy as well as those who are relatively experienced. It will be persuasive regarding the feasibility of solar development, but will also enumerate the present difficulties and obstacles associated with deployment of solar energy systems. It will have a basic explanation of solar systems, with reference to sources of further information both instate and in the country.

Each handbook should be directed so that the reader feels that it is really about his state and about the possibilities of solar development where he lives. It will describe specific solar installations throughout the state based on information provided from data sheets distributed to all known solar manufacturers, retailers, builders and innovators in the state.

Relationship to Similar Projects

Montana's Energy Office published a Renewable Energy Handbook early in 1977 which covered much of the basic information needed for the Solar Handbook. Much of this, updated where necessary, will be incorporated into the Solar Handbook.

Type of Organization Which Should Perform Work

Publication of the Solar Handbook and subsequent updating should be the task of the State Energy Office in coordination with the State Solar Committee, the Solar Network staff, and the Field Representative of Western SUN.

Potential Impact on Solar Use in 1980 and 1985

Publication of a comprehensive solar handbook will definitely facilitate the growth of interest in and development of solar energy. The handbook will encourage individuals and communities to utilize solar energy by putting them in touch with grant sources as well as with those individuals, organizations, government agencies and documents which can provide technical or informational assistance. The handbook will aid in making the idea of utilizing solar energy more visible in the state, and thus promote legislative action at the local and state level to remove institutional barriers which presently inhibit the progress of solar development.

With an effective handbook, there should be a well-established statewide network of solar manufacturers, retailers and innovators by 1980. By that time much of the necessary data collection of solar resources throughout the state should be compiled. By 1985, we can expect much of the needed legislation to be on the books; the financial community of the state will have implemented a well-defined loan program for solar installations; and the state government will be taking an active role in the promotion of solar energy development.

Feedback Required to Evaluate Results

The reader will be able to evaluate the handbook through a questionnaire at the back. Comments will be solicited from handbook staff personnel in other states as well as from the Solar Committee. In addition, key people in the grassroots solar movement, the solar business community and public officials will be contacted to determine if the handbook is having the desired impact.

Schedule

Sometime in the spring of 1978 the Montana Energy Office will publish the first Montana Solar Handbook, which will be a directory of the existing solar resources, services and projects. Because one can expect solar development to undergo a rapidly increasing rate of change, the handbook must be continually updated. Such revision will require a full-time staff charged with the responsibility of publishing a revised handbook or supplements to the handbook on a regular basis.

Projected Annual Costs Estimates

	Montana	Region
A. Personnel (FTE 1.5)	$15,000	$292,000
B. Fringe Benefits (14% of personnel costs)	2,100	40,950
C. Travel	2,000	3,900
D. Equipment	500	9,750
E. Supplies	500	9,750
F. Subcontracts	3,000	58,500
G. Others (Publication)	14,000	273,000
TOTAL	$34,400	$670,800
H. State Contribution: Office Space		

Project Duration: Ongoing

B.3 Renewable Energy Traveling Roadshow

Description

An organization in each state will be given the responsibility of designing and producing portable informational exhibits, hardware, slide shows, theater, workshops, movies, videotapes. The organization will coordinate showings of this traveling program in the state and, when applicable, in the region. The organization will apprise all media (newspapers, radio, TV) of the show's schedule and events. The organization will update material in the roadshow every year.

The roadshow will benefit greatly by coordination -- networking -- with other programs. Staff should work closely with all other programs, to keep current information available and to help highlight and publicize other events taking place in the state.

A responsibility of the roadshow will be to identify "energy coordinators" -- people in each town who are interested in taking part in the solar network, identifying needs and skills in their towns and communicating these to the Network Program staff, and taking a leading role in town and local planning in renewable energy. In Montana, the New Western Energy Show has begun this in 1977. The State of Vermont has also identified town energy coordinators, who have taken the lead in town energy planning, discussion and innovations since 1976.

Rationale

Traveling roadshows ("Medicine Shows or Chautauquas") were common in America in the early part of the century. Communications, particularly in rural areas, were difficult; the roadshow brought information and news, coupled with

entertainment, debates and discussions to the people.

It is now recognized that one of the biggest deterrents to the rapid development of solar energy in this country is the people's lack of information and understanding about this form of energy, its possibilities and its limits. And interestingly in this age of supermedia, we find that the various "impersonal media" (radio, TV, newspapers, magazines) cannot do a complete job of teaching people. We've learned that people must see, touch, build, talk with experienced experts to believe. We've also learned that different people learn in different ways: some will read, some want to build something, some learn concepts better through theater or music or by talking with someone. We've learned that the grassroots "traveling roadshow" approach can fill this information/learning gap.

A traveling roadshow can offer all these and more to the people of a state. It can be a meeting place, it can aid the networking process, it can be a spark to start any number of projects and programs. It can bring various elements of society (citizens, politicians, entrepreneurs, businessmen, rural and city folk, old and young) together for discussion and interaction in a relaxed atmosphere. It can be an invaluable aid to the development of solar energy.

Approach

Montana's Alternative Energy Resources Organization (AERO) has taken a roadshow -- the New Western Energy Show -- around the state for two summers now, and is establishing a year around, fully-staffed center for the show in Helena. The organization has documented all aspects of the show, and has an excellent library of photos, slides, videotapes and informational pamphlets describing the show. An hour-long 16mm color/sound movie of the show will be completed by the end of December, 1977. The center will be in a position to give training

workshops by summer of 1978.

Colorado's Sunshine Company has also assembled a traveling exhibit, combined with workshops. Their roadshow is an indoors exhibit with information panels and much written information. The Colorado show is in the process of being duplicated and the information translated to other languages for presentation in many countries overseas.

California's Office of Appropriate Technology, inspired by the New Western Energy Show, has assembled a "New Possibilities Show" -- a small, brightly painted trailer equipped with "ideas - tips - tools - products" demonstrating appropriate technologies. The show (driven by a New Western Energy Show graduate) has been traveling around California since May of 1977.

We suggest that each state choose an organization to assemble it's road-show, and that the organization become familiar with AERO's, California's and Colorado's information and experiences in preparation for the formation of their own show.

Type of Organization Which Should Perform Work

In Montana, a nonprofit citizens' membership organization assembled the New Western Energy Show; in Colorado, a nonprofit organization assembled the Sunshine Company; and in California a state office (Office of Appropriate Technology) put together the New Possibilities Show. Each state should choose the appropriate organization from those available.

Potential Impact

This depends on the caliber of the show. The impact in the case of Montana has been considerable.

Feedback Required to Evaluate Results

Feedback will come in the form of response to the show, acceptance of its message, and actions resulting from the information disseminated. If the show is successful, this feedback will be prompt and visible.

Schedule

Time required to prepare a roadshow is dependent on the show's size and scope. A full roadshow such as the New Western Energy Show will require at least six months of preparation.

Projected Cost Estimate

Costs will vary with the size and scope of the show. In Montana, a full roadshow with a fourteen member troupe, exhibits, hardware, information panels, library, vehicles, theater, music, workshops, etc., costs about $40,000 a year for a two and a half month summer tour and was previously funded through the Montana Renewable Alternative Energy Program.

Projected Annual Cost Estimate

	Montana	Region
A. Personnel (varied)	$17,500	$341,250
B. Fringe Benefits (14% of personnel costs)	2,450	47,775
C. Travel	5,000	97,500
D. Equipment	10,000	195,000
E. Supplies	5,000	97,500
F. Subcontractor	1,000	19,500
G. Others	500	9,750
TOTAL	$41,450	$808,275

H. State Contribution: Optional

Project Duration: On going

D. 1 Solar Curricula for Grades K-12

Description

School curricula involving solar energy and topics related to solar energy will be developed resulting in lesson plans, projects and experiments for students, and instructional aids and props. The curricula will be designed for particular grade levels, and it will teach necessary skills to understand the relationships between the natural world, energy flows, and people, and to evaluate various energy-use strategies.

Rationale

We have stated earlier that we feel education in every sector to be a necessary prerequisite to an effective program of solar energy development. Formal education is of paramount importance in this effort, and as yet no comprehensive primary and secondary education programs have been developed.

Educational curricula teaching solar energy concepts can involve a broad spectrum of topics, skills and interests. By touching on subjects ranging from physics and economics to natural history, sociology, etc., curricula can encourage students to integrate skills and facts usually identified with various subjects into one whole.

Priority and Why

As part of Montana's general plan to disseminate solar information broadly in the initial stages of the programs, development of solar curricula is rated seventh after programs of broader effect and before programs of more limited application.

Deterrents and Incentives Addressed

Although there are no deterrents to developing the solar curricula itself, the use of it can be hampered because solar curricula would have, in most cases, a lower priority than basic skills (3 R's) in a teacher's plan. On the other hand, in all grade levels solar curricula provide both an interdisciplinary introduction to the natural and man-made environment and the skills to evaluate our energy situation.

States Which Should Be Involved

Although not all states need develop solar curricula, each physiographic region (Northern Great Plains, Pacific Northwest, etc.) should have a curriculum that includes solar energy information specific to that region.

Approach to Be Used

The solar curricula should be developed by a small centralized group of people under contract with Western SUN with input from many sources. Once the solar curriculum is developed it should be implemented by means of the Teachers' Solar Educational Workshops, K-12, project D.2.

Relationship to Similar Projects Being Conducted by Others

Different groups have already written energy curricula and resource material in general and these are available. Some are written for specific purposes of learning situations and others for special interest groups. The group responsible for this program will review all material available before developing its own curricula.

Type of Organization Which Should Perform Work

Existing organizations either public or private with educational and solar expertise should develop the solar curricula. It would be nice to have one organization prepare the curricula but it may be necessary to contract with both a solar and an educational organization.

Potential Impact on Solar Use in 1980 and 1985

This program will promote widespread familiarity with solar energy by 1980; by 1985 young people (all potential decision-makers) will be familiar with, and knowledgeable on, solar power as a useable energy source.

Feedback Required to Evaluate Results

Written evaluation by teachers and students involved with the solar curricula will provide the necessary feedback.

Schedule (based on arbitrary start date)

This project could commence immediately. The development of solar curricula should not take more than a year; however, the development of visual aids to accompany the curricula might take longer.

Projected Annual Cost Estimate

	Montana	Region
Total	0	$75,000[1/]

Project Duration

On going.

1/ Contract let by Western SUN to perform work.

A.4 Solar Media Information

Description

Successful commercialization of solar energy devices will largely depend upon public awareness of their value and availability.

The simplest way to reach the greatest number of people with solar messages is through existing media networks -- television, radio, newspapers and magazines. A great number of these messages can be aired at no cost through the use of public service announcements.

More detailed messages can be aired on television through the use of films, slide shows, panels, and interviews, and by providing news departments with suitable features and facts on a continuing basis.

Newspapers also are an important media outlet suitable for publicizing and popularizing solar energy. Besides reporting news of solar events many will be receptive to printing solar oriented columns (syndication is possible here) and feature stories. In addition, they should be encouraged to incorporate solar information such as degree days, hours of sunshine, insolation data into the regular weather reporting. However, many newspapers will not be inclined to generate such material themselves. Information must be distributed to them on a regular and reliable basis.

Much of the production of such materials should be centralized and deal with a specific state's needs: climatic conditions, tax incentives, assistance programs, etc., plus the state's policy on solar energy development.

Rationale

The public will not know of the availability and value of solar energy systems until they are sufficiently informed. To gain public acceptance of

solar, we must reach the greatest number of people through the use of channels with which they are already familiar, such as radio, TV, newsprint, etc. Except for initial production costs we have discovered that media time and space is available to us at minimal charge.

Priority and Why

The development of solar media materials deserves a high priority and is rated eighth. Through the media we can reach the greatest number of people who in turn can impact the commercialization of solar devices.

Deterrents and Incentives

Public media are an obvious vehicle to address current deterrents to solar development, to publicize new incentives, and to provide a forum for discussion of both.

States Which Should Be Involved

All states must be involved. Information must be shared and publicized. States should handle individually much of their in-state programming (talk shows, radio and TV, local news features).

Approach to Be Used

A centralized media production unit on a regional level should be activated for the production of public service announcements (films, slide shows, news features) which will provide general solar energy information. The media unit will work closely with field representatives in order to keep abreast of new developments in the region.

Also, each state will need a smaller production unit to produce items which are state specific in nature. This unit will maintain close contact with networkers, energy coordinators, energy extension service and all energy development programs in the state.

Relationship to Similar Projects

Montana already plans to develop and produce some of its own solar media materials - particularly public service announcements for radio and newspaper. Some of these materials may be applicable for use in all states while some will be specific to Montana. We are unaware of what media efforts other states are developing but duplication of effort should be avoided to save time and money.

Type of Organization to Perform Work

The centralized production should be performed by a professional production company; one with experience in solar energy would be preferable. Statewide production capabilities should be developed by a local media person or group.

Potential Impact

To commercialize solar energy use we must first develop a solar market, and this can only be realistically accomplished if we have an informed public. The public must "pull" industry into the solar market by demonstrating a demand for such equipment. A well-coordinated media effort could have substantial effect on the attitude of the public toward solar energy utilization and on its willingness to accept this concept.

Feedback Needed to Evaluate Results

The effectiveness of this program can be measured by public reaction to the information disseminated by the media.

Schedule

The development of solar media information should commence immediately.

Projected Annual Cost Estimates

	Montana	Region
A. Personnel (1.25 FTE)	$15,000	$292,500
B. Fringe Benefits (14% of personnel costs)	2,100	40,950
C. Travel	1,000	19,500
D. Equipment	1,500	29,250
E. Supplies	1,500	29,250
F. Subcontract	3,000	58,500
G. Others	0	50,000 1/
TOTAL	$22,600	$490,700

H. State's Contribution: Optional

1/ The Western SUN should develop and provide the generalized solar media material to each state; the $50,000 is for this service.

Project Duration

Ongoing

A.5 Collect Solar Hardware Information

Description

All data on solar energy hardware, including characteristics, prices, manufacturers, dealers will be collected and filed. A means of easy access to this information by all citizens, organizations and agencies will be established. This material will be updated continually so that all information is current.

Rationale

Any coordinated network dealing with education, development and demonstration must have easy access to complete hardware data. "You can't show people how to ride without a horse."

Priority and Why

We have given this project 9th priority. This work will be started - is indeed started already - in many parts of this country, and there remains only the job of coordinating and integrating it into this plan.

Deterrents and Incentives

There's no deterrent stronger than bad publicity created by someone's having hardware failure. Good information, well distributed, can help keep this from happening, and give people more confidence in the better-crafted products.

States Which Should Be Involved

Every state in the Western SUN should be involved.

Approach

The United States Department of Energy (DOE) has expressed interest in funding an organization or several organizations from each of ten regions in the country to collect this information for their region. If this happens, each state should coordinate with its information-gathering organization(s), setting up a good data retention and dissemination system. The system should probably be computerized (Montana is considering a proposed "Montana Integrated Energy Information Transfer System"which is computerized), and should be coordinated with the systems developed by the other states of the Western SUN. If DOE decides not to fund the initial data gathering as suggested above, an organization in each state should be given the responsibility to update the information continually. In order to disseminate this information, the services of this activity will be well publicized.

Relationship to Similar Projects Being Conducted by Others

Various organizations and agencies in every state have collected or are collecting data on solar hardware. It should be the responsibility of this project's staff to conduct these groups and consolidate all existing data.

Type of Organization Which Should Perform Work

The organization or agency given this task should be capable of collecting and coordinating information, should have contacts within the solar community of the state, and should have some previous experience and familiarity with solar hardware. If the DOE's funding comes through, this should be the organization DOE has chosen to collect data in the state.

Potential Impact on Solar Use in 1980 and 1985

Good hardware information will stiumulate development of solar energy considerably.

Feedback

Users of the data collected will provide feedback. If the access system is difficult to use, or if the information is out-of-date or incomplete, people will let the project staff know about it.

Schedule

Data collection has begun in most states. A more coordinated effort may have been initiated by March of 1978; if not, it should begin then. Most preliminary data should be collected and coordinated by May of 1978. By that time a filing and access system should be established, and the data should then be fed into this system. From May, 1978, all data should be updated continually.

Projected Annual Cost Estimate

	Montana	Region
A. Personnel (FTE 1.25)	$14,000	$273,000
B. Fringe Benefits (14% of personnel costs)	1,960	38,220
C. Travel	1,000	19,500
D. Equipment	1,500	29,250
E. Supplies	750	14,625
F. Subcontracts[1/]	13,000	253,000
G. Others	750	14,625
TOTAL	$32,960	$542,720

H. State Contributions: Optional

Project Duration: Ongoing

1/ In case DOE does not initiate the data collection, these funds would be available for this function.

C.1 Solar Technician Training

Description

Each state will provide complete courses to train people in the sizing and installation of solar systems.

Rationale

One of the most vital current needs in every state is a labor force of persons experienced and skilled in the sizing and installation of solar equipment. This fact was dramatically demonstrated recently in New England, when a solar water-heating system demonstration failed because many of the systems to be demonstrated were installed wrong. We feel that a program to train installers can help us avoid such failures in the West, and at the same time aid considerably in increasing the number of installed and working solar systems.

Priority and Why

This program is number 10 on our list. We feel it is vital to a coordinated program in solar development and demonstration.

Deterrents and Incentives Addressed

A prime deterrent to a person wanting to install a solar system is the inability to find someone capable of helping that person install the system. This program will alleviate that deterrent, which exists in every state at this time. A prime incentive to a person to consider a solar system is the presence of well-trained and capable people ready to install and/or fix the system. This program will help insure that a large force of such qualified people exist in every Western SUN state.

States Which Should Be Involved

Every state in the Western SUN should be involved.

Approach to Be Used

Several states and organizations have ongoing solar technician training programs. The Western SUN should do a survey of these programs, and choose the program most applicable to utilization in this region. A workshop manual should be created from this program, if one does not exist already. Two appropriate trainees from each state (chosen by the state's Solar Committee) should be given training in conducting workshops. These trainees will then return to their individual states and begin a series of workshops to teach solar technician training programs in vocational schools, junior colleges, high school shops, adult education programs, and colleges and universities.

Relationship to Similar Projects Being Conducted by Others

Several states have ongoing solar technician training courses. These should be reviewed closely before a program or type of program is decided upon, and the best program or the best elements of several programs should be used by Western SUN.

Type of Organization Which Should Perform Work

Western SUN should do the initial inventory of ongoing solar technician training programs. If possible, people already involved with the best program they identify should conduct the initial workshops. The choice of trainees for the project should lie in the jurisdiction of each state Solar Committee.

Potential Impact on Solar Use in 1980 and 1985

Very substantial increase in solar development could result from this vital program, both by 1980 and by 1985.

Feedback Required to Evaluate Results

Results of this program are quantifiable by the simple method of keeping track of solar installations in a state, determining the identity of the installers and assessing the quality of the installation job. Responsibility for this will lie with the state's Solar Handbook staff (program B.2).

Schedule

This program should begin in early 1978; identification of a viable program should be accomplished in two months; state workshops should begin by fall of 1978; and each state should have an instate technician training program in progress by late spring of 1979.

Projected Annual Cost Estimates

	Montana	Region
A. Development of a Training Manual by Western SUN (6 months)	---	$ 55,000
B. Western SUN's Workshop for state's trainees (4 month)	---	45,000
C. State's Training Workshops (2 years)	$35,000	682,500
TOTAL	$35,000	$782,500

D. State's Contribution: Negotiable

Project Duration:

Three Years

D.2 Teachers' Solar Educational Workshops, Grades K-12

Description

The purpose of this project is to provide instruction to school teachers on general solar information, emphasizing the best methods to incorporate solar curriculum into lesson plans. Materials developed through project D.1 ("Solar Curriculum for Grades K-12") will be presented in workshop format to teachers to enable them to incorporate this information into their everyday lesson plans. The Western SUN will provide standardization of the curricula to eliminate the need for each state to develop its own solar educational package.

Rationale

The importance of educating young people about energy choices of the future is paramount. Energy consciousness must be learned at an early age and the public school system is the obvious and logical choice to provide this service.

The workshop is an effective method of training teachers. Teachers, teachers' aides, student teachers, special education and fine arts teachers will be able to use their skills to bring the information learned at the workshop (plus prepared solar information packets) into the classroom.

Priority and Why

Although this project received a priority of 14th, it has good regional application. Teachers' solar workshops should be developed and administered on a regional level to allow for standardization, but the actual workshops should be conducted by local state Solar Committees and the Field Representative of Western SUN to provide a local emphasis.

Deterrents and Incentives Addressed

This particular project will help to expose our young people, who will be the leaders and consumers of tomorrow, to the reality of the energy situation today and to an understanding of the possibilities that solar options hold for the future. A solid understanding of solar energy use will be a definite incentive to young people to utilize these options later when they are in a position to choose.

States Which Should Be Involved

These workshops should be conducted in all thirteen states in the Western SUN.

Approach

Western SUN should contract with an educational institution to develop the workshop curriculum and prepare the solar information packets. Local state Solar Committees and field representatives can sponsor the workshops.

Relationship to Similar Projects

Similar projects are being developed locally, although Montana knows of no regional effort to date. Developers of the curricula and the workshops should analyze all local efforts for possible input.

Type of Organization to Perform Work

The Western SUN would assume the responsibility for developing solar workshop curricula and solar information packets. States' Solar Committees and the field representatives of the Western SUN would organize and hold the workshops.

Potential Impact on Solar Use 1980-1988

As with all solar education programs, this one has potential for a substantial impact. Both teachers and students will learn from the program, and undoubtedly a large fraction of each group will subsequently make use of solar energy.

Feedback Required

Questionnaires could be used to evaluate the effectiveness of those workshops.

Schedule

The startup should be geared to coincide with the start of the next school year.

Projected Annual Cost Estimates

	Montana	Region
A. Personnel	$14,000	$273,000
B. Fringe Benefits (14% of personnel costs)	1,960	38,220
C. Travel	3,000	58,500
D. Equipment	500	9,750
E. Supplies	1,000	19,500
F. Subcontracts	2,000	39,000
G. Other	1,500	29,250
TOTAL	$23,960	$467,220

H. State's Contribution: Negotiable

Project Duration

On going

B.4 Retrofit Manual

Description

Retrofit manuals should be written for a state or a consortium of states with similar climate or geography and be based on Berkeley Solar Group's "Solar for Your Present Home," written for the California Energy Commission. (This manual pertains to the San Francisco Bay Area.) States in the western region experience unique differences which they must address to establish retrofitting as a feasible solar option.

Rationale

Retrofitting older homes with solar devices can be a most difficult task considering the nonuniformity of the buildings. However, retrofitting could have the greatest payback in terms of fossil fuel energy savings, and it will aid Montana's effort to meet its portion of Carter's goal of 2.5 million solar homes by 1985: Montana's share exceeds 8500 solar homes. This retrofit manual is not intended to be a substitute for the Solar Handbook, but will assist homeowners in assessing their solar retrofit potential and will provide the necessary guidance to allow them to monitor the retrofit.

Priority

We have placed this program twelfth; the reason for this is that the project cannot begin until the Berkeley Solar Group has prepared the original manual for California and has established a method for other states to adapt it to their situation.

Deterrents and Incentives Addressed

Solar retrofitting of older homes can be a most difficult task. Persons attempting to retrofit without adequate knowledge of solar conditions run the risk of having the effort fail, which in turn could work as a deterrent to solar commercialization. Yet there lies in solar retrofitting the potential to prepare thousands of older homes to utilize solar space and domestic water heating, and, if done properly, this would substantially bolster solar development and lessen conventional energy use. Montana sees the retrofit manual as a valuable incentive to the public to make use of the huge retrofit potential.

States Which Should Be Involved

States in the Western Region should develop retrofit manuals tailored after the Berkeley Solar Group's manual but address the concerns and conditions unique to the area. Most probably, states with similar geography and climatology conditions could write a single manual.

Approach to Be Used

Montana recommends that the states with similar geographical and climatological conditions work together to write a single manual with one state taking the lead role, and subcontracting with the other states to provide the necessary information. This manual should contain such things as general information about solar water and space heating, performance estimation data, economic assessment techniques, design methods for passive solar heating and discussion of relevant local conditions influencing solar devices. It should also provide the techniques and tools for the homeowner to examine his house to determine its solar potential. The owner may be able to determine the life cycle costing with simple economic formulas. The owner must know what to look for in sound solar

systems and how to install the solar devices, step by step, to insure proper installation.

Relationship to Similar Projects Being Conducted by Others

As stated earlier, California has written the "Solar For Your Present Home" and has shown interest in writing a manual applicable to the entire state. Also, other states in the region have indicated a strong interest in writing such a manual.

Type of Organization Which Should Perform Work

Montana suggests that the State Energy Office be contracted to do the actual writing and publishing of the manual, and that the data accumulation be shared by the staff coordinator of the state's Solar Committee, field representative of Western SUN and State Energy Office. Again, it may be desirable to contract with one state in a particular subregion to write and publish one manual for the subregion, with the other states involved contracted with to provide input.

Potential Impact on Solar Use in 1980 and 1985

It should be possible through feedback to quantify the numbers of homes retrofitted by 1980 and 1985 in order to assess accurately the direct impact.

Feedback Required to Evaluate Results

Many states in the Western Region have tax credits for solar installation. Through the state's income revenue departments we should be able to identify

individuals claiming the tax credit and conduct follow-ups to determine if the retrofit manual was used.

Schedule

The research, writing, editing and publishing of the retrofit manual should commence immediately.

Projected Annual Cost Estimates

	Montana	Region[1]
A. Personnel	$14,000	$98,000
B. Fringe Benefits (14% of personnel costs)	1,960	13,720
C. Travel	1,000	7,000
D. Equipment	500	3,500
E. Supplies	5,000	35,000
F. Subcontracts	10,000[2]	70,000
G. Others	10,000	70,000
	$42,450	$297,220

H. State's Contribution: Negotiable

1/ Probably seven manuals would suffice for the Western Region.
2/ Contracting with other states in a subregion to provide the necessary input, i.e., for a three state subregional manual.

Project Duration

One year.

C.2 Government Employees' Solar Training Program

Description

The Government Employee Training Program will have three primary objectives: 1) to provide (one-half to one day) awareness-type orientation sessions to state and local government employees of all types: 2) to provide intensive capacity building sessions to government employees with duties closely related to the wider application of solar technology; and 3) to provide opportunities for government employees of all types to gain hands-on experiences in the construction and installation of low cost solar devices and systems. Each component is described in greater detail below:

1. Awareness/Orientation Session: This component would be designed as a flexible add-on learning unit for regularly scheduled training sessions for all types of government employees. The purpose of these brief introductory orientation type sessions would be to provide government employees with basic information about the application of solar technology in each state and the region. Leadership of the sessions would not require advanced skills -- much of the material could be prepackaged on slides/tapes/hand-outs. The sessions would also have an emphasis on conservation technologies. At the end of each session the participants should be able to identify sources of reliable information on solar technology, have a basic understanding of any tax incentives or loan or grant programs available for solar technologies, and have an appreciation for the need to remove barriers to the wider application of solar technologies.

2. Capacity Building Sessions: This component would be designed to further develop the skills of government employees holding jobs which are of critical importance to the wider implementation of solar technologies. Examples of the

types of jobs in question include building inspectors, vocational education curriculum designers, program developers/grantsmen, tax assessors, consumer protection advocates, architects and engineers. In many cases the capacity building sessions would draw together government employees filling comparable roles from several states. Leadership of these sessions would require a high level of skill and experience. One focus would be to accelerate the transfer and application of organizational/policy/procedural innovations that have been proven successful in promoting the wider application of solar technologies. Because many of the sessions may be exploratory in nature, it may be necessary initially to define what new skills persons doing many government jobs need in order to assist in the wider application of solar technology. Documentation of the capacity building sessions will be important.

3. Hands-On Personal Development Sessions: This component would be designed to allow government employees to gain practical experience with low cost solar technologies. Some states may want to consider developing a demonstration center as a site(s) for conducting the third component of the government employees training program. These hands-on sessions would be open to all types of government employees regardless of job classification. The objective of these sessions would be to assist state and local government employees to adopt solar technologies to meet their own needs and to provide advice and assistance to other citizens who are interested in owner-built systems. Leadership of these sessions would require moderate levels of skills.

Rationale

Government employees represent a fixed asset with significant potential to impede or advance the wider application of solar techniques. The quality of

learning opportunities available to them will greatly influence the role they play. In the past many states have required all state employees who drive to take defensive driving courses. The Government Employee's Training Program takes this precedent and expands on it. Because the salaries, travel and other overhead expenses of government employees are already provided for they are potentially a very significant outreach force for increasing public awareness of solar technologies.

Priority and Why

This project was rated thirteenth, although it has the potential to be rated among the top priority projects. Its success would depend on a strong commitment and on good coordination.

Deterrents and Incentives Addressed

The government employees training program will address three general types of deterrents:

a. Lack of access to information about incentives and reliable technology.

b. Lack of expertise in solar technology within many areas of government which have a decision making role in the technology transfer process.

c. Lack of opportunities for low cost skill development and exchange among owner builders.

States Which Should Be Involved

All states should be involved. California's Office of Appropriate Technology (OAT) provides a model for the program. Montana's Institute of Appropriate Technology (MIAT) is focusing on developing the third component at the present time.

Approach to be Used

Each state energy office should be responsible for making arrangements for orientation sessions. They can lead the sessions themselves using materials developed through the planning process; contract the leadership to a group within their state; or a combination of the above. This activity (orientation/awareness sessions) might prove to be the basis for a CETA project in many states.

The capacity building sessions should be coordinated for all states in the west by the Western SUN. The various state plans may provide the basis for initial planning of these types of sessions. Provision should be made for leadership by a single state that already possesses excellence in a particular area.

The hands-on sessions should be developed on a state-by-state basis by solar advocate groups or community colleges/universities. Western SUN should play a networking role providing exchange of approaches and software among participating states.

Potential Impact on Solar Use in 1980 and 1985

A well-run government employee's training program could have significant impact on solar use in both 1980 and 1985. Government employees are themselves a major market for solar technologies. Creating a climate receptive to solar technologies and innovations within the bureaucracy will be a key challenge in the effort to increase solar use. Facilitating the transfer of bureaucratic or socio-technical innovations -- not developing more hardware -- is the real task for increasing solar use in the near term.

Feedback Needed to Evaluate Results

A follow-up letter to participants in the orientation session three months after each session is completed would serve as a helpful check for states putting on these types of sessions. It would also serve as a planning tool for improving the orientation sessions.

The capacity building sessions would have to be evaluated on a case-by-case basis because of their exotic or limited scope. Over the long term it would be possible to evaluate this portion of the program in terms of policy changes and rate of use of solar tied to tax or other government regulation.

The hands-on sessions could be evaluated in the same manner as the orientation sessions.

Schedule

Orientation begins on May 19, 1978; Capacity Building in July, 1978; and Hands-on in June, 1978.

Projected Annual Cost Estimates

	Montana	Regional
A. Orientation	$21,000	$409,500
B. Capacity Building		
a. States	5,000	97,500
b. Western SUN	--	250,000
C. Hands On	22,000	42,900
TOTAL	$48,000	$799,900

D. State Contribution: Negotiable

Project Duration:

Ongoing

E.1 Wind Data Monitoring (Western States)

Description

To prepare for utilization of the wind resource in the western states, existing wind data must be supplemented and more accurately evaluated. Once a sound base of wind data is available, wind systems will be sized for the climatological and geographical conditions in specific areas; and then the systems will be properly sized for power grid utilization (REA, Bureau of Reclamation, etc.), for industrial and commercial scale application, and for small scale rural and urban usage.

First, states must determine if the local demand is for large-scale wind turbines capable of generating electricity into grid systems or for medium or small-scale wind turbines suitable for commercial, household or remote projected use. A ten meter, single, unsophisticated anemometer may be sufficient for measuring on-site windspeeds for a household application. More complex monitoring would be required if the decision was to install a DOE/NASA Mod-1 wind turbine. If the wind turbine is to be used in association with, or as a back up to, solar thermal or electrical production, solar insolation recording should be done simultaneously at the site. The wind data should be correlated to the nearest or most geographically similar station to achieve a historical wind characterization.

Rationale

Currently available maps of average wind power potential in the United States provide only rough estimates of this power. Many are based mainly on measurements obtained near ground level at airports. However, airport locations are usually chosen to avoid high or gusty wind speeds. Airport data is often used to extrapolate high altitude wind measurements at some given height. Such extrapolations have shown that the high Great Plains region of the United States

has an extremely high wind power potential. However, the height of airport anemometers varies with each site. Since wind velocity increases with height, and since power availability is a function of the cube of the velocity, the exact height of the anemometer is extremely important if extrapolation to greater heights is to be conducted. Models for extrapolating data are usually topographically determined: a model suitable for determining wind velocity in the Great Plains from ground level data may not work in mountainous terrain. The co-efficients in model equations must also be verified per location to validate their usage. A minimum of three anemometers per tower is suggested for verification of co-efficients.

Priority and Why

This program has fourteenth priority on our program. It is an important program which should take very little lead time to implement.

Deterrents and Incentives Addressed

This program addresses a major deterrent to the utilization of wind power: we must have good wind data before we can site wind plants properly.

States Which Should Be Involved -- And Approach to be Used

Preliminary investigations indicate of the twenty-nine highest average annual wind power potential sites in the United States, three are located in Montana, seven in Wyoming, and three in California. California currently has two monitoring towers, Montana has one, and Wyoming has one. Effort would be focused toward much more thorough and accurate monitoring effort in each of these three states as an initial effort. Since tie-in with hydrogeneration facilities may be an effective integration system for wind generators, locations

with utility connections to such grids should receive emphasis.

A secondary effort would expand the wind prospecting effort to other states in the thirteen state region which show higher wind potential.

Relationship to Similar Projects Being Conducted by Others

Sandia Laboratory has conducted an excellent preliminary wind power analysis based on wind data from 758 National Climatic Center weather stations. For this preliminary study, exact anemometer heights were not known, but assumed at ten meter, thus injecting the potential for substantial error. The National Weather Bureau is currently collecting anemometer height histories at these 758 weather stations. Based on this more recent data, Sandia Laboratory will rerun their model to assess more accurate projections of wind power potential. This update should be utilized for a gross comparison of site location potentials in the region.

Two major wind monitoring programs exist in the United States. The first is a federal DOE wind prospecting project being managed by the Battelle Pacific Northwest Laboratory. The second is independently installed federal or private wind monitoring stations.

A. Wind Prospecting Program. DOE's effort to identify sites of highest wind potential has focused on utility participation to identify sites in the country which would be suitable for integrating wind generated electricity into their grid system. Meteorology towers were installed at the seventeen selected sites if none existed. From these towers wind speed and direction are measured at both 9.14 meters (30 feet) and 45.92 meters (150 feet). Such heights provided sufficiently accurate data for determining power potential for both large and small-scale wind turbines and for correlation with local

airport wind data.

Lockheed Corporation has mapped, by extrapolating from existing data, potential wind power in the United States at varying heights of ten meters (32.81 feet), 50 meters (154.05 feet), and 100 meters (328.1 feet). Their data suggests that substantially more power is available at 100 meters but no anemometers recorded wind speeds at that height. There are no known plans to install solar insolation monitoring stations at these sites.

B. Independent Monitoring Station. Three independent monitoring stations exist in the thirteen state Western Region: A DOE sponsored tower project at the Rocky Flats Small Wind Turbine Facility, Colorado; a Bureau of Reclamation proposed tower project at Medicine Box, Wyoming; and DOD sponsored tower at Glasgow Air Force Base, Montana.

1) Rocky Flats: There are two towers 1,000 feet apart monitoring wind speed and direction at both 10 (32.81 feet) and 40 (131.24 feet) meters. Temperature is also taken at one of the towers. Solar insolation data is not being recorded.

2) Medicine Bow: Five towers at separate sites will be installed with anemometers at ten meters each. Solar insolation data is not being measured.

Type of Organization Which Should Perform the Work

Engineering firms should perform the work on this project.

Potential Impact on Solar Use in 1980 and 1985

A proper and thorough monitoring of windy areas in the western states will accelerate the rate of utilization of this resource substantially by 1980 and 1985.

Feedback Required to Evaluate the Results

Correlation of new monitoring tower data with existing models and airport data will be necessary to evaluate the results.

Schedule

This project could commence immediately. The time schedule is suggested below:

1) Analyze airport data in Montana, Wyoming and California for power potential - March 1, 1978 through July 1, 1978.

2) Select high power potential areas - July 1, 1978 through September 1, 1978.

3) Determine large/small scale wind turbine preference for areas of high wind speeds - September 1, 1978 through November 1, 1978.

4) Select area for monitoring tower installations - November 1, 1978 through January 1, 1979.

5) Install tower and begin monitoring - January 1, 1979 through March 1, 1981.

Projected Annual Cost Estimate[1/]

	Montana	Regional
A. Personnel (2.5 FTE)		$30,000
B. Fringe Benefits (14% of personnel costs)		4,200
C. Travel		2,000
D. Equipment		12,500
E. Supplies		1,000
F. Subcontracts		10,000
G. Others		3,500
TOTAL	0	$63,200

H. State's Contribution: Optional

1/ This budget does not include cost of tower purchase and installation noted under the heading schedule, item 5, since this would depend on wind turbine selection. This portion of the budget must be negotiated later when all facts are known.

Project Duration

Three years.

E.2 Aids to Solar Innovators

Description

The Center for Innovation (CFI) which is a division of the Montana Energy Research and Development Institute, Inc., (MERDI), Butte, Montana, proposes to provide the Western Solar Utilization Network (Western SUN) with a strong program of support for developing selected innovative renewable (solar energy) projects conceptualized by inventors. This support will include well qualified, competent technical and marketing evaluation of the projects and continued planning asssistance for commercialization of the projects.

Rationale

The CFI is presently conducting these services for private individuals and small businesses in a five state area. Funding for CFI is currently through the Old Western Regional Commission and the Montana Department of Natural Resources and Conservation, with additional funding pending from the Economic Development Administration. Funding from the Western SUN would enable CFI to increase its staffing base, and expand its current activities to provide meaningful and valuable technical services to all states in the Western Region for innovative solar projects.

Deterrents and Incentives Addressed

CFI could eliminate or help to eliminate many deterrents know to solar energy utilization today by developing, testing and manufacturing of innovative solar devices.

States Which Should be Involved

The CIF is presently engaged in activities in Montana and the other four states of the Old West Region. However, with funding from Western SUN, activities

could be easily expanded to all the states within the Western Region.

Approach to be Used

The CFI proposes to handle only those projects referred to them from Western SUN. CFI will analyze all projects but only come up with plans of action for those projects that are chosen because of their potential. CFI will provide Western SUN with reports on all projects with recommendations.

Relationship to Similar Projects Being Conducted by Others

To our knowledge, the services offered by CFI to inventors are unique and no similar projects are being conducted in this country.

Type of Organization Which Should Perform Work

The CFI is the organization which should perform the work because it is currently structured for this service and has the necessary talents to implement this project.

Potential Impact on Solar Use in 1980 and 1985

The primary potential impact is to aid the process of making the latest techniques and concepts available to the general public. By assisting the development and production of innovative solar ideas, CFI will increase the availability of solar devices to the general public; this should have a substantial favorable impact on solar commercialization by 1980 and 1985.

Feedback Required to Evaluate Results

The various states in the Western Region should be encouraged to record information on the numbers and types of solar systems used that were initially supported through CFI's efforts. This follow-up would provide meaningful feedback on results of the CFI program.

Schedule

Depending on the starting date which could be at anytime, the schedule should be ongoing. It is the experience of CFI that a period of at least three years is necessary to take ideas from the innovative state on through to commercialization.

Project Cost Estimate (Montana and Regional)

The cost estimates for amount required would, of course, depend on the number of projects referred to CFI from the Western SUN. However, judging from past experience, CFI would need $10,000 per project. If CFI handledfour or five projects from each of the states in the western region, then probably $500,000 a year would cover all expenses. However, this figure is subject to negotiation depending upon the number of projects referred to CFI from the Western SUN.

C.3 Prisoner Solar Panel Construction for Public Buildings

Description

The Solar Panel Prisoner Construction Project is designed to utilize the prisoner labor force found in state and federal retention institutions located in the states of the Western Region. The purpose of Solar Panel Prisoner Construction Project is to manufacture solar systems (for solar water and/or space heating), increase the number of public buildings retrofitted with solar systems, and most importantly, provide prisoners with sound occupational therapy through meaningful and functional duties rather than such tasks as stamping out license plates.

Rationale

The solar industry is in the embryonic states of development and needs assistance from all segments of society to foster its immediate growth. Montana believes that prisoners can play a meaningful role in many areas within the Western SUN. Too few demonstration projects exist that advertise the availability of solar energy. A prime reason for the small number of solar demonstration projects, especially public buildings such as post offices, schools, courthouses, state capitols, city halls, libraries and even prison facilities is simply the lack of funds to purchase and install solar systems. The Solar Panel Prisoner Construction Project would help to alleviate the financial barriers confronting solar installation of public buildings.

Prisoners can be a reliable and inexpensive labor force. Additionally, the assembly of most solar systems is well within the capability of this labor force. In 1975, there were over 35,000 prisoners in state and federal institutions in the Western SUN region.

Solar utilization, with its potential for useful employment today and in the future could represent a new lease on life for prisoners. Prisoners could be trained to design, manufacture and install solar systems; a prisoner could then feel upon being released that he/she could find employment in the prosperous growing solar industry.

Priority and Why

Although the Solar Panel Prisoner Construction Project is not high on Montana's priorities, we feel that this unique project has a tremendous regional application.

Deterrents and Incentives Involved

This program will:

1) Provide meaningful occupational therapy to prisoners
2) Help decrease costs of solar systems
3) Increase the number of public facilities retrofitted with solar systems

States Which Should Be Involved

This project is implementable in each state of the Western Region and nation.

Approach

Western SUN will contract with a staff of solar energy specialists who will be responsible for training the correctional facility technical staff; these will in turn train and supervise the prisoners in solar system design, manufacture, installation and maintenance.

Type of Organization Which Should Perform Work

The Western SUN would initially contract with solar specialists to:

1) Determine the feasibility of this unique project and identify solar devices that are within the capability of the correctional institution; and

2) Develop the methodology for solar system manufacturing and then educate the technical staff of the correctional institution to operate the manufacturing operation.

Relationship to Similar Projects Being conducted by Others

We are aware that Florida has initiated a somewhat similar program, but we have no details.

Porential Impact on Solar Use in 1980-1985

Undoubtedly, this project will enhance the development of the solar industry in the Western Region.

Feedback Required to Evaluate Results

Progress reports by the correctional Solar Training Staff would be required to evaluate the success of the project. On-site inspection by a standarization team would insure the safety of the operation and compliance with standards. Additionally, the institutions would be required to conduct system performance tests which will conform to national or regional standards.

Schedule

Too many unknowns exist to allow for realistic development of a complete schedule. The feasibility study could commence immediately, however, and it might be appropriate at the conclusion of the feasibility study to run a pilot program at one institution to determine the viability of the program.

Projected Cost

It is extremely difficult to determine the budget for this project without

extensive research of retention institutions, mode of operation, the potential market and the particular solar system that should be constructed.

Project Duration

Ongoing

E.3 Small Scale Hydro Development

Description

Potential small-scale (low-head, 50 Kw--15Mw) hydro sites in the western region will be identified. Included will be existing water impoundments and waterways with impoundment potential. These sites will be studied to determine potential generating capacity and projected power costs. Montana has alreadyidentified 3 existing water impoundments suitable for retrofit with low head electricity-generating turbines. In cases where the situation is favorable, low-head turbines will be installed.

Rationale

Running water can be a renewable source of electric power, and is an indirect solar energy source. It would be sensible to develop this power on a small-scale basis, keeping fully aware of both near-term and long-term environmental and social consequences.

Priority, and Why

This projects is 17th on our list. Work has begun in this area already, and the program, once started, should proceed relatively rapidly.

Deterrents and Incentives Addressed

These are not readily identifiable at this time.

States Which Should be Involved

All states in the Western SUN should be involved.

Approach to be Used

The inventorying of potential small-scale hydro sites and follow-up feasibility studies (including marketability of the electricity) are well within the purview of the Western SUN. This work should be managed/monitored by Western SUN, but regional

engineering firms should be contracted to perform the actual inventories and studies. Western SUN and each state should then negotiate directly with DOE for money to conduct the engineering analysis and design of each site chosen for development; such costs will be high, probably in the range of $200,000 to $500,000 per site.

Relationship to Similar Projects Being Conducted By Others

The New England states are already developing low-head small-scale hydropower with federal and local funds. The State of Idaho is inventorying potential sites for low-head hydrodevelopment and has conducted several feasibility studies with positive results. The DOE's Idaho Falls Regional Office recently released a PRDA for feasibility studies of potential sites within their region for developing low-head hydropower. Montana feels that this is a unique opportunity to get vital research and development work done, with a good chance of federal assistance, and with a good opportunity to coordinate with these other states' ongoing programs.

Type of Organization Which Should Perform Work

(See Approach)

Potential Impact on Solar Use in 1980 and 1985

The development of small scale hydroelectricity generating sites will lessen somewhat the need for solar thermal or photovoltaic electricity-generating facilities in 1980 and 1985.

Feedback Required to Evaluate Results

Each new installation of a low-head turbine is a large project; feedback will come through all the channels common to the reporting on and publicizing of large projects.

Schedule

The project should commence immediately. Analyzation of each state's current hydro development status should take three months. The inventory of potential hydro sites will take another three months. Feasibility studies of the likely sites will take six months. Within a year or fourteen months action should begin to install turbines at the most viable sites in each state in the Western SUN.

Projected Annual Cost Estimtes

	Montana	Region
A. The state of small scale hydro development in the western states	---	$100,000
B. Inventory of sites for small hydro development	---	250,000
C. Feasibility studies of the small scale hydro sites	---	600,000
TOTAL	---	$950,000

D. State's Contribution: Negotiable

Project Duration

One to two years

E.4 Wind/Solar Community Farms

Description

Each state in the Western SUN will establish one or more solar and wind projects on an appropriate farm or ranch in the state.

Rationale

The Western Region has a very large rural population, and a good portion of the land area is devoted to farms and ranches. These rural areas have their own set of energy problems, their own lifestyles, and their own advantages and disadvantages in terms of energy use. A program addressed to rural energy problems could have a large application in the West, and could be the means to alleviate much of the pressure being brought to bear on our country's fossil fuel supply. Results of ongoing rural solar energy programs in other states indicate that a good many rural energy usage problems could be solved utilizing solar energy and/or wind energy.

Priority and Why

We have given this program 18th priority on our list. We feel that it is important, and should be coordinated by this effort, but we feel that much of the information which could be helpful to this program will be generated by programs to which we have given higher priority.

Deterrents and Incentives Involved

This is a demonstration program. As with all demonstration programs, the deterrents it addresses are those that are involved with people's reluctance to try something they haven't seen or experienced. Conversely, the establishment of demonstration devices and equipment which proves the workability of a concept

is a strong incentive to people to try such systems for themselves.

States Which Should Be Involved

Every state in the Western SUN should be involved.

Approach to be Used

The Agriculture Assistance Act of 1977 includes a section which gives the U.S. Department of Agriculture the authority to set up solar demonstration farms in each state of the union. Twenty million dollars is authorized for this project, but no money has yet been appropriated for the purpose of implementing the project. According to the act, the demonstration farms would be set up on state-owned land, and it is suggested that this be land being utilized by Experimental Research Stations. Montana suggests that in each state the Solar Committee work with the state Agricultural Extension Service to insure that money is appropriated for setting up solar demonstration farms. Concurrently, the Western SUN should conduct an inventory of existing rural solar demonstration projects such as the Small Farm Project in Nebraska; using information gained from this inventory, western states should work with the federal government to set up wind/solar community farms, and should monitor thoroughly each system demonstrated. Some states (Montana is one) may have appropriate land for the establishment of a renewable energy demonstration farm, under the jurisdiction of an agency other than the Agricultural Extension Service. (Montana's State Department of Natural Resources and Conservation owns a ranch on which it is already developing renewable energy projects and systems.) In this case, the Solar Committee should determine which spot in the state, under which state agency's jurisdiction, is the most appropriate for the development of a wind/solar community farm.

Relationship to Similar Projects Being Conducted by Others

Montana is aware of an excellent development and demonstration project being conducted in Nebraska for the Center for Rural Affairs, and called the Small Farm Project. This project is funded by the Federal Community Services Administration. Undoubtedly there exist other projects which could provide valuable information and advice to those coordinating this program, and all these projects should be studied closely before we proceed with this program.

Type of Organization Which Should Perform Work

The Western SUN should conduct the inventory of similar projects in the country; with results from this inventory, each state's Solar Committee should take responsibility for getting a renewable energy rural demonstration program established.

Potential Impact on Solar Use in 1980 and 1985

This program has the potential to make a substantial impact on solar use in rural communities by 1980 and 1985.

Feedback Required to Evaluate Results

Feedback will come in the form of the rate of expansion of solar energy use in rural areas, where this increased use can be traced to results of the demonstration systems installed at the farm or ranch established by this program.

Schedule

This program can be initiated as soon as the Solar Committees are set up in the states of the region and the Western SUN is established in Portland. Negotiation with state agencies for a site can take place in conjunction with the

Western SUN's inventory of other states' ongoing projects. The farms should be established within two years.

Projected Annual Cost Estimate

	Montana	Region
A. State's Solar Committee working with Agricultural Extension Service to develop solar demonstration farms (ongoing)	$ 7,000	$ 136,500
B. Western SUN's inventory of rural solar demonstration projects (one year)	---	35,000
C. Development of state's solar demonstration farms (ongoing)	75,000	1,462,500
TOTAL	$82,000	$1,634,000

Project Duration

Ongoing

E.5 Wood Utilization and Impact

Description

A thorough inventory will be conducted of the state's wood resource and its current wood utilization and protection practices. Concurrently, research will be conducted to ascertain the most advantageous way(s) of utilizing this resource for heat production. Emphasis in this research will be placed on identifying ways to avoid air pollution and ways to maintain the source.

Rationale

Wood can be a renewable energy resource if it is utilized wisely. Extensive burning of wood can pollute the air. We must learn how to use wood wisely if we are to utilize it to help replace fossil fuel energy.

Priority and Why

This project is 19th on our list. Much study has been and is being conducted on the utilization of wood energy, and the most important remaining job is coordination of the information and formation of sensible policies concerning the use of wood as an energy resource.

Deterrents and Incentives Addressed

There is no need to provide incentives to encourage wood energy use; wood has been used for heat for thousands of years and is one of the most obvious 'alternatives' to fossil energy use. The most important goals of this program will be to identify deterrents to unlimited and uncontrolled wood energy use, to develop ways of burning wood that avoid pollution, and to suggest means for developing policies that encourage the wise use of wood.

States Which Should be Involved

All states with timber in enough quantity to be identifed as an energy source should be involved.

Approach

Each participating state will conduct an inventory of all wood-related research and data collection that has been conducted instate. This information will be transferred to Western SUN, which will choose organizations to conduct research where information gaps are identifed. Western SUN will use networkers (see program A.2) to help identify qualified research organizatons for this work. Policies for wood energy use will be developed for the region in accordance with research findings.

Relationship to Similar Projects being Conducted by Others

All other known wood energy research, both in the Western Region and in other regions of the country, will be culled for relevant information before new research is initiated for this program.

Type of Organization Which Should Perform Work

Western SUN will coordinate the program. Each participating state will identify by means of its networker and Solar Committee members research studies, data on its wood resource and methods and extent of wood utilization in the state. Western SUN will identify the appropriate research organizations within the 13-state region to undertake the studies deemed necessary to provide full information for, and facilitate, policy-making.

Potential Impact on Solar Use in 1980 and 1985

This is difficult to determine at this time.

Feedback Required to Evaluate Results

The most effective feedback for this program would be the incorporation, within 2 years and by each participating state, of a sensible and coordinated wood energy utilization policy.

Schedule

This program should begin in the fall of 1978 and should be completed by the spring of 1980.

Projected Annual Cost Estimates

	Montana	Region
A. Personnel (FTE .25)	4,000	28,000
B. Fringe (14% of personnel costs)	560	3,920
C. Travel	500	3,500
D. Equipment	--	--
E. Supplies	250	1,750
F. Subcontracts	--	125,000 1/
G. Others	--	--
TOTAL	4,810	162,170

H. State's Contributions: Negotiable

1/ Western SUN contracting with research institutions to conduct research and analysis.

Project Duration: Two years

FINANCIAL WORKSHOP

SECTION I

MONTANA'S

SOLAR FINANCIAL WORKSHOP

Sponsored by:

Montana Energy Office
Montana Solar Planning Committee
Solar Planning Office - West

Held on: November 15, 1977
Location: State Capitol Building
Helena, Montana 59601

EDITOR'S COMMENTS

This report contains the discussions that went on at the Solar Financial Workshop. The Montana Energy Office takes all claim for the editing as the actual minutes of the workshop were lengthy and at times the discussions were extremely wordy and pointless. For the most part, the words are still of the discussants and we feel that we were able to successfully preserve the contextual consistency.

EXECUTIVE SUMMARY

Montana's Solar Financial Workshop brought together fifty-seven people--including financiers, appraisers, real estate agents, state employees, representatives of citizen groups, and more -- to discuss the role of the financial community in solar energy development, particularly the identification of barriers presently discouraging financiers from making loans to builders who wish to utilize renewable energies, and then the search for procedures that would alleviate or eliminate these barriers.

Much information was shared in discussions and presentations and the following are some of the conclusions reached:

1. Our dwindling fossil fuel supply is causing more and more people to look toward solar energies as supplements and substitutes.

2. Solar systems exist and are in the process of development which can completently fill the energy gap that is opening as conventional fuels become more scarce and expensive.

3. The financial community must necessarily play a vital role if the use of renewable energy is to be encouraged.

4. Several Montana banks have already loaned money to solar home builders.

5. Financial institutions in some areas of the county have developed means of determining which solar systems they feel are reliable enough to be considered for a loan, and have instituted solar home loan programs.

6. Many Montana financiers and assessors have a definite interest in developing similar programs.

7. The solar loan programs discussed in this workshop stress the use of "approved solar systems" as necessary to the approval of a loan. Discussion with Montana's various builders and contractors leads us to believe that more flexibility should be involved in the loan-approval process. To allow for loans on self-built, well-made but not "officially approved" systems, it is suggested that the individual designer builder's experience, solar expertise and past record be considered in the loan decision. Of course, this would necessitate the production of some guidelines and the development of expertise on the part of someone in the lending institution, but it has become obvious that solar education is a modern necessity in all walks of life. Experts exist throughout Montana who could help financial institutions develop these guidelines. It is further suggested that Montanans designing and building their own systems be directed to local research and development organizations such as: Montana's Alternative Renewable Energy Source Program, Energy Solutions, Drapes Engineering Co., etc., for assessment of their systems (payment for services may be involved).

LIST OF PARTICIPANTS

Lieutenant Governor Ted Schwinden	
*Mr. Larry Geske	Executive Vice President Great Falls Gas Company
Mr. Bruce Wilcox	Partner - Berkeley Solar Group, Berkeley, CA
Mr. Peter Sardagna	Assistant Vice President San Diego Federal Savings and Loan, San Diego, CA
Mr. Terry Savage	Private Citizen, Dilemma--Financing the Solar Loan of His Own Construction, Lolo, MT
*Ms. Kye Cochran	Alternative Energy Resource Organization, Administrator, Billings, MT
Mr. Dana Gunderson	Engineer, Montana Renewable Alternative Energy Program, Department of Natural Resources and Conservation, Helena, MT
Mr. Michael Elder	Loan Officer, American Savings and Loan Association, Helena, MT
Mr. Jack Moore	Appraiser, Jack Moore and Assoc., Helena, MT

* Members of Montana Solar Planning Committee

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I. Opening remarks by TED SCHWINDEN, Lieutenant Governor:

The role of my office in the energy field stems from a directive from the Governor. He challenged my office to develop a comprehensive energy plan for the state. This plan included drawing up a State Energy Conservation Plan (this was assisted by federal dollars); evaluating the energy distribution and flow in Montana and taking the necessary steps that might be needed to minimize impact of shortages of hydroelectric in the northwest due to drought conditions, and developing a state program to encourage the maximum use of alternative energy sources (which is the reason for this workshop).

It is unfortunate as indicated by recent polls that there is much public apathy and unawareness of the existing problem. Many working in the energy field could see the handwriting on the wall as petroleum and natural gas becomes increasingly expensive and scarce.

There are some problems that keep people from turning to alternative energies. One is the financial constraint, but I am amazed and pleased to see the excellent turnout for this workshop which shows your concerns. Another problem is that people feel what they have today works -- so why worry about the future? They dislike change. Also, people are reluctant to leap in -- they want to wait until others try it as they are concerned about the certainty of the technology.

The purpose of today's workshop is to look at the degree to which financial constraints might exist and ways they might be mitigated. Once, they felt that rubber tires on tractors would never make it; and they were slow to catch on -- but now you don't see any lugs. The inevitability of change is clearly going to happen, and I hope that these discussions with the experts will acknowledge the problems and formulate solutions that will make it easier for both the financial community and the individual.

II. Summary of Montana's solar planning effort by LARRY GESKE:

The Department of Energy (DOE) is currently sponsoring four regional solar planning efforts involving all the states in the country; Montana falls within the thirteen-state Western Region. Each state within the western planning group has received a grant to study and identify problems which hinder the development of solar energy within that state. Toward this effort, Montana has formed an in-state Solar Planning Committee consisting of individuals from both government and private sectors.

Each western state will form a suggested solar development plan, geared toward overcoming identified hinderances to its solar development, and submit this plan to the Regional Planning Office in Denver. The office will assimilate the better points of each state's suggested plan and develop a regional plan. The various regional plans may differ substantially because of differences in climate, geography, etc. DOE will review the regional plans and provide funding to implement them.

According to President Carter, we should have two and a half million solar units installed in buildings in this country by 1985; Montana's share of this would be about 8000 units. The Solar Energy Industries Association (SEIA) has projected eleven million solar units in the country by 1985; that would mean approximately thirty-five thousand for Montana. What the actual figures are by 1985 depends on us and how well we set goals, carry out those goals, and keep everybody informed. I was surprised to see the results of the survey we sent to all lending institutions in the state which showed that about twenty-five percent of the lending institutions have already made solar loans.

III. Solar Equipment Technology re: Financing Installation by BRUCE WILCOX with LARRY GESKE, Moderator:

Our first speaker is Bruce Wilcox of the Berkeley Solar Group. The Berkeley Solar Group offers consulting services relating to energy management and solar energy

utilization in residential, commercial and industrial settings. They have extensive experience in solar applications, energy use, thermal analysis, computer science, mechanical engineering, economic analysis, architectural design and education. Bruce is a partner of the Berkeley Solar Group. One of the main reasons I sought Bruce as a speaker was that his company has evaluated over 70 commercial solar water systems and pool heating systems in support of the Bank of America's Solar Home Program and they also plan to review solar heating systems under consideration for financing by the Bank of America. Bruce has a degree in architecture from the University of California, Berkeley, has three years of professional experience in architectural design and has taught solar energy system applications, equipment design and energy conservation for buildings and graduate architectural classes at the University of California. With his partner he is developing a computer technique for modeling the thermal performance of active solar heating systems and he directs all aspects of the group's work. He is responsible for a computerized building energy use study that the Berkeley Solar Group has performed. He is also involved in solar system design, equipment evaluation research and is a member of the International Solar Energy Society and is the Vice President of the Northern California Energy Association. I would like now to present to you Bruce Wilcox.

BRUCE WILCOX:

As Larry said, the main reason for my being invited here has to do with the work I have been doing for the Bank of America. I don't represent the Bank, but belong to a private consulting firm which has done a considerable amount of work in the last six months in developing a solar loan program, the first component of which is a retail dealer loan program for retrofitting solar systems such as domestic hot water and pool heating systems, mainly into existing buildings. This program operates for both a dealer generated loan and as a standard for home improvement loans for

individual customers. The Bank is also beginning to develop a standardized program for doing mortgage financing on new construction; and, we have been assisting the appraisal department in evaluating this project. We have inspected the products of about forty manufacturers in California. We have looked at their equipment and applied a set of standards that we devised in cooperation with the Bank to decide whether or not the Bank should finance this particular equipment and to determine if it would meet the needs of the Bank in terms of their financing program. The basic fundamental approach has been to avoid problems that are predictable -- in other words to be conservative.

My ideas of what the Bank of America has been concerned with and which you should probably be concerned with in financing solar equipment are: 1) If things happen the way they are projected, there is going to be a substantial amount of business for banks. Solar equipment is very capital intensive and must be financed by somebody. There is a future business development aspect to getting into solar now. 2) Secondly, a solar program right now for a bank is one way of showing that the bank is progressive and that they are concerned with today's energy problems and are doing their part to meet the nation's needs, etc. In other words, it is good public relations. I think the above are two main reasons that bankers want to get into solar at this time.

Why do they get involved with a program like ours? First, when they do make loans on solar equipment they would like to be able to collect when it comes time to get repaid, and there is a basic fundamental reality at banks: it becomes rather difficult to collect on loans if equipment is no longer operating. The fundamental thing is to try and avoid the kind of problems that would encourage the customer to think that he was justified in not paying back the loan.

In California there is a law called the "Over Due Course Act." The significance of this act is that if a bank essentially cooperates with the dealer in generating loans, and if the bank buys the contracts from the dealer, then the bank is ultimately responsible for the performance of the system. If the purchaser can't get satisfaction from whoever sold him the equipment he can then go after whoever owns the contract. So essentially on this kind of dealer generated business the bank is going into partnership with the dealers. Consequently, there is a real strong motivation for making sure that whatever equipment goes on the market and is installed is going to give as few problems as possible.

Finally, the bank in promoting a solar loan program is encouraging its customers to buy solar equipment and, of course, would like to be reassured that it is not encouraging people to do unwise things that are going to cause them problems because ultimately, this would reflect on the bank.

I have taught engineering classes for the last couple of years at the University of California and tend to take a professional engineering approach to solar energy. One of the fundamental rules is to avoid failures in whatever kind of systems you design and install. We must know what the problems are likely to be and freely discuss them. When I discuss potential problems of solar energy systems, it doesn't mean that I don't think that solar energy systems are a good idea or that they won't ultimately be successful or that there aren't good ones around now. But I think it is essential for the development of the solar industry that people not push problems under the rug. I think that it is really critical at this point in the development of the solar industry that we be very realistic about the future potential of solar heating and domestic water systems, and that the problems that exist are brought out into the open so that people don't make the same mistake over again. But when you sell systems on a retail basis to customers who are concerned about supplying heat, the burden is

on the industry and all the people involved to insure that what is installed has a very good probability of working.

From a bank's point of view, the problem of looking at solar systems is one of finding the value of the system. The three primary considerations are aesthetics, performance and longevity.

Aesthetics is an interesting issue. Many solar houses are not conventional looking. For instance, in California they don't look like a Spanish type house with a tile roof, which can be a problem for some people. But it doesn't mean they are ugly. I have a basic feeling that aesthetics of architecture follows function -- so after a period of time something like a carplace or front porch which started out as something to protect you from the rain or to keep you warm eventually becomes integrated into the whole style and becomes something that is desirable. I think solar collectors will in time end up that way.

There are several issues in the area of performance. First, does the solar system deliver the energy savings that the buyer expects? In other words has he been sold a bill of goods or is there realistic appraisal? I don't think there is any magic amount of energy savings that a solar system should deliver -- depends on the cost, the circumstances, the climate and a lot of other things. But I do think it is critical that everybody expect the same thing and that it deliver what is expected. To give you a rule of thumb, with a space heating system we usually look at something between 1/2 and 2/3 of the energy delivered per square foot per year in a space heating system. Domestic solar water heaters should deliver somewhere between 2/3 and 3/4 depending on the application. The second issue is, does it deliver all the heating and hot water that the customer can expect under normal conditions? When he turns on the faucet on a cloudy day in December is he still going to get hot water? It is essentially an issue of what kind of back-up systems are installed to work when the solar system is not working due to bad weather or for whatever reason.

Most people buying a new house and installing solar equipment in their house will expect ultimately to get about the same kind of performance they get out of a normal hot water heater. Even if the solar system works fine, they will be unhappy when their system doesn't work during cloudy weather in December.

Third, the system must have low maintenance and operating costs. Any kind of a system you put in that is really going to do the job is going to have to be almost maintenance free under normal conditions. Also you need to check whether your equipment is going to require you to be an expert mechanical engineer to operate it. I don't think that is acceptable for most retail and widespread use.

Another related issue is, must there be someone there at all times to take care of emergencies that the system is not designed to take care of? A classic example of this (and probably wouldn't happen in Montana) is found in California where people have been tempted to buy systems that don't have any freeze protection because it hardly ever freezes in California. This means that whenever it is cold you have to be there to drain the system or cover it up with a blanket or else it will freeze. And inevitably the system always ends up freezing while you are away at a New Year's Eve party and forgot to go home and drain the collector or something. I think it is really critical that the system not require fantastic amounts of maintenance or protection.

Another issue is that the system must be absolutely simple. Otherwise there is little chance that it is going to last without failing. Some heating systems are designed to have as many as thirty motorized valves and when you have thirty motorized valves the probability that one of them is not going to work is probably more than 100%. This is the kind of solar system you don't want to install. This is a real strong argument for passive systems which are indestructible, intrastructure type systems that lets the sunshine into the building and so on.

Performance -- the only way you can avoid this problem is to require some kind of standardized procedure for calculating performance. Probably one of the simplest and most straightforward is contained in the "HUD Intermediate Minimum Property Standards in Solar Heating and Domestic Hot Water Systems" which just came out.

In determining expected performance one must accurately estimate the heating demand. You can overstate the output of your solar system and lead people to believe it is going to do more than it will (90% rather than 60%). On the other hand, if you lead people to believe they don't need much energy by manipulating engineering calculations to prove that a small solar system is going to work, then the end result is the same.

Another issue is just bad design. One of the classic examples of the past is that solar designers concentrated on the solar collectors and ignored the more conventional parts of the system to cut the costs. You end up with a system that doesn't perform well even though the solar collector is good.

Three basic criteria should be considered with respect to equipment life. One, will it last as long as the period of the loan. This may be one of the more significant ones from the lender's point of view. If the installation is on an existing home and a home improvement loan is used to finance the installation (this type of loan is usually limited to five years or less), the equipment life should last longer than the loan life. I am not sure how to deal with mortgage loans. I don't think most mechanical systems are designed for thirty year life--even air conditioning systems are usually considered to last about fifteen years.

Second, will the equipment last as long as the warranty period -- especially since the bank is somewhat responsible. HUD seems to be pushing for a five year warranty on all systems that are going to be installed on their demonstration program. Of course, you realize the warranty is only as good as the company that stands behind it. The bank feels it is better to have a shorter warranty because that limits their liability. From the consumers' point of view, will it last long enough to

pay back the cost of the system in energy saved?

The State of California pays 55% of the cost of the system up to $3000 as a credit on your state income tax. This tax incentive really makes investing in a new solar house desirable since you buy a house on a thirty year mortgage and get half the cost of the solar system back in the first year. That is an excellent return on your investment.

Some of the general problems with solar equipment are: degradation, materials wear out -- plastics turn yellow from the sun, paints on collectors start turning gray because of degradation, scale builds up on the inside of the system, i.e. pipes, and sealants wear out. A house built in 1959 in Denver by Dr. George Lof (a pioneer in the solar business) was very well instrumented when built, and was studied for years. After fifteen years ERDA conducted a study to determine how efficiently it was now operating compared to how it originally operated. After fifteen years, the system had degraded about 30%. So you can expect material degrading -- the question is how much. Of course, there are also outright failures. Major categories of failure are things like collector freezes and breaks, corrosion and stagnation. Stagnation occurs whenever the system isn't operating, when the sun is out and the system cannot take the heat out of the collector fast enough. The panels then heat up until they reach the point where the heat drawn from the collector equals the heat absorbed; and with a well-designed collector -- the more efficient your collector the more stagnation problem you have. All of the materials in the system have to be able to take this extreme temperature.

How do you avoid these kinds of problems? I think the first thing to do is to deal only with reputable, experienced, appropriately licensed people who have experience in what they are doing and have a stake in maintaining their own reputation and investment.

Secondly, you make sure that the buyer knows what to expect, including performance and how long it is going to last and particularly that people understand what they have to do to make sure that the system lasts. If the antifreeze has to be changed every two years, then there ought to be an instruction book that says change antifreeze every two years -- if you don't it will fall apart. Instructions on how to operate the system must be included.

When you can, finance solar systems that have been tested, certified, optimized and so on. The most common testing procedures are called the ASHRAE 93-77 or the OMBS. Basically, this test checks the instantaneous efficiency of the collector. What you really want to know is how the whole system is going to operate. But testing the whole system is more complicated than testing collectors. The people who have paid to have the tests done by the independent testing labs are probably the ones that are serious in the business. California has a program that will be in operation next spring that will certify collectors.

In summary, I think it is really important that bankers get involved in financing solar equipment because it is necessary for the growth of the industry and necessary for solving some of our energy needs in this country through solar energy. I think it is very important that people in the industry in general as well as bankers take all care possible to avoid widespread failures and shortcomings. I think the answer is to do it but be careful and intelligent about how you do it.

IV. A Banker's Approach to Solar Lending by Peter Sardagna:

LARRY GESKE, Moderator: Peter Sardagna is from the Newport Beach Office of San Diego Federal Savings and Loan and is head of their commercial loan department and also handles their solar and energy loans. He has been involved in solar for over five years, first in his own private business and then with San Diego Federal. He has designed solar systems and was responsible for the first solar subdivision on the outskirts of San Diego which contained some twelve homes.

PETER SARDAGNA

We lenders have to protect ourselves and the borrower. The twelve homes that Larry alluded to was a guinea pig subdivision and we encountered problems. I might mention that the solar systems installed were installed at no cost to the buyer and they knew they were going to be experimental. In those days there were no solar experts, so the only way to learn was by trial and error and to use a lot of common sense and engineering know how. At San Diego Federal we have approached the problem of lending and have in fact come out with the first program of its kind in the United States. We will finance retrofit and new construction utilizing solar equipment over a period of years. To date we have made somewhere between fifty and sixty such loans.

The single biggest problem that I encountered when I entered the solar business was the $2000 price tag for a hot water heater. It was hard to sell Mrs. Jones on $2000 for a hot water heater. It's not like a color TV which is much easier to sell. The only basis on which the equipment can be marketed is hopefully Mr. and Mrs. Jones will listen to someone's promise of saving dollars. Each month they write a check to their friendly utility company and each month this bill increases. So there is some rationale in paying the cost for a hot water heater or a space heater system because you can save on those monthly bills. Hopefully that would be enough incentive for them to invest. But if the investment has to be made in one lump sum, then you wind up with only affluent people doing it. Affluent people's motivation hasn't been so much economic as being the first one on the block to have a solar collector. The fact that natural gas costs them sixteen cents a therm and it only shows one and a half percent return on the investment is beside the point. They want a collector on their roof so everyone can see they are doing their part for their country and saving energy. Although it might sound good, I really don't believe that is a realistic motivation to get the general population to invest in solar equipment.

Somehow the bottom line always reads economic. Solar technology has to make economic sense -- as it now does, even when you know what the problems are and the limitations of the systems. We as lenders address ourselves to those systems. From a hard investor's standpoint the system has to make sense now. Systems that we finance do. In the southern California area with utility rates as they are, domestic hot water systems will show a ten percent or more return on investment -- net of maintenance costs -- where the electric rates are running around four to five cents per kilowatt hour. They will not show that return when the system is competing against natural gas. The largest and most widely used equipment in southern California is for solar pool heating. The reason for this is that you don't need sophisticated, high-temperature, glazed collectors. Less expensive collectors can be used which produce inexpensive heat and thus can compete against natural gas. For space heating in California our experience has been that a solar system will show ten percent or more return on investment in high cost areas like fringe areas where the electric rates are rather high.

The principal criterion for financing a solar system is that it makes economic sense; it will show a ten percent return on investment. We also know that the value of the energy generated by this system will increase as the conventional energy costs increase. We share the concerns for aesthetics as we approach the problem of appraisal. In financing the systems over thirty years, the question that we have asked ourselves is on what basis can we increase the appraised value of the solar home -- let's say we are comparing a $50,000 solar home and a comparable home of about the same value. House B doesn't have a solar system, but Mr. Jones in House A puts one in. It's a domestic hot water system that costs $2000 and he is saving $200 to $250 a year. What does this do to our appraiser and how is he going to evaluate it? We discussed this problem for months and the hard conservative view of the appraiser was:

I can't point to homes that have historically sold for more because they have a solar system. There is no track record for appraisers to say "in fact this house is worth more." So then we looked at it form the economic point of view we mentioned earler. The added criterion now is the cost of utilities on the home, and that a home has a lower operating cost. The conclusion we came to is that House A with solar will be easier to sell to the extent that more people can qualify for financing. Now this is just an indirect conclusion. We do not have a track record to say that is the way it is. We also think that it makes sense that the home would be easier to sell because the cost of the energy generated by the system will remain constant. We definitely feel that the home is more marketable and more valuable. We decided we would increase the appraised value of the home by the cost of the system provided such increases would not be more than ten percent of the value of the home -- on a $50,000 home we would increase the appraised value by $5000, provided that the $5000 additional costs is used for installation of a solar heating system, and that this system shows at least a ten percent return on the $5000 invested. We have been pioneers here and hopefully history will catch up and prove that we were right.

Our doors have not been beaten down by people clamoring to get loans. This is something that initially baffled me, especially in view of the attractiveness of the loans. As an example at 9 and 9 1/4% interest on a water heating system, the monthly payments on the system are actually less than the cost of the energy today. So what argument can the consumer have for not putting a solar system in? There is no argument on an economic basis, provided it is a well-designed system. There is no valid argument especially with the 55% tax credit (for California). The return of investment capital is almost infinite to you under this latter condition. So what is stopping people from putting in systems? The biggest obstacle, I think, is simply that the people do not know that this is available. They do not know that

systems are there to do the work now. Everyone still claims that solar is in the embryonic stage -- still in the laboratories. I think this is the biggest single fear the industry has to overcome. The hurdle of financing and economics has been overcome to a great degree in California.

As time goes on and utility rates go up as we all expect them to go, more areas will be able to show a fair return on investment.

In getting our loan program off the ground we had to ask ourselves, "What solar equipment are we going to finance?" We searched for some kind of standards but there wasn't any. California is just now coming out with a standardization program and we are working closely with the energy agency. Being a pioneer, we had to develop our own criteria or guidelines which are very general in nature. The intent is to protect ourselves and the consumer against system failure. The first thing we look for in any manufacturer is a copy of independent test results. We don't want the manufacturer's or the consumer's opinion about what a system will do. We want results of a thirty day stagnation test and more than a five percent reduction in efficiency will not be acceptable. It's a little more stringent than HUD requirements. What does the testing results tell you? Well, you get back a sheet full of fancy formulas and you have to be an engineer to interpret it. But you can compare collectors on an apples for apples basis. That tells you whether it is a good collector as far as efficiency is concerned, the type of material that it is made of, etc. Here, you can use a lot of common sense.

We also insure that the solar installers are qualified. We require that they have experience installing at least ten systems which we can go out and inspect and interview the owners. This tells us that the installers are experienced and have a good track record. Also, we check on the contractor financially if we have a dealer arrangement with them.

We check out manufacturers financially to ascertain if they are strong enough to stand behind their warranties. We do not feel that warranties in excess of five years are realistic at this point yet. On the other hand we do expect five years to be a reasonable time in which the contractor or manufacturer should come back and correct any problems. We are quite sensitive to our liability to the borrower. We don't want to end up holding a bag with a bunch of pipes and boxes of equipment that don't work.

Our approval or disapproval of an individual system depends basically on the standard design. Modifications can be made from home to home: the distance from storage tanks to the collectors is a consideration. We also look for the basic standard design that the installer will follow in all the installations with only minor deviations.

Standard plans are prepared by a qualified professional engineer. All of the contractors and installers are licensed for the work. We also require that they take out a building permit.

We think that it is very important that solar be architecturally tied into the surrounding area like any custom built home. It should blend well in the area. It can't be an oddball on the street. There are very clever ways to do it -- by using parapets and other screening devices. Collectors have been cleverly built into roofs to look like skylights. Sometimes it takes considerable expense, and that should be cranked into the economics.

We encourage all of our tract developers to install the basic plumbing and wiring in the homes and offer solar as an option. We are sold on it and convinced that in the next five years it is going to become very successful and a major industry. Our company has joint ventures with residential developments and in all of these we are putting in the basic pipes and wiring. In fact the homes are designed so that the

roofs are oriented correctly and collectors can easily be added.

How deep a lender should go into the technical aspects of a system, I am not quite sure. We welcome the certification program that is coming in California. Hopefully, that will include not only the collectors but the entire systems as well. We are very adamant about the certification program for the industry -- engineers and architects. Special courses are needed to qualify them for solar engineering. Conventional engineering practice doesn't qualify an engineer to jump into solar system design. We are waiting for the day when we can rely on someone else to make us feel comfortable about solar equipment. We will, of course, look at the list of manufacturers and installers as we do for conventional construction.

In conclusion, the program that we have come up with is thirty year financing for new construction. We simply include the cost of the solar heating system right along with the brick and mortar, and then we go eighty percent of the appraised value. As long as we have the first mortgage we will also finance and retrofit over thirty years. We also have a program for any amount over $2500, where we will finance over fifteen years -- amortization at one percent below the current home improvement loan rate. That is 9 3/4% on solar heating systems.

V. A Private Montana Citizen's Problems in Financing an Energy Efficient Home by Terry Savage.

TERRY SAVAGE

What I have been trying to do in Superior, Montana, is install a hydroelectric plant with a subterranean house. I have been trying to do this for about a year and a half and the financing is impossible. In Missoula I have approached almost all the financial institutions and found them totally unreceptive.

I own a piece of property near Superior, Montana, consisting of a hundred acres. On that property I have an existing dam site and an existing irrigation system

consisting of about 1000 feet of 20 inch steel pipe and about 900 feet of 13 inch steel pipe with a 13 inch shut off valve. I have hired Mr. Delp of Independent Power Developers from Noxon, Montana, to engineer the site for two possible hydroelectric systems -- either a 12 kilowatt system or a 24 kilowatt system. Mr. Delp can answer any questions on the feasibility of the systems.

I am presently two miles from Montana Power, the only public power source, and they want $14,000 to run in power lines. Mr. Delp can put in a hydroelectric system using the 12 kilowatt system for about $13,000. The economics of the hydroelectric system are favorable. When you consider the long term there is no question about which system I would prefer. The large hydroelectric system would be more than enough to run my house, a shop building, garage, greenhouse, and possibly even to produce hydrogen.

I designed a subterranean house. The reason I chose a subterranean design is because it is the most energy efficient structure that can be built. The stable moderate temperature of the ground saves enormously on the heating and cooling costs. In fact the earth surrounding the house reaches its highest temperature about the time one begins to need heat, and it drops to its lowest temperature about the time one starts to need cooling. The mass of the concrete in the house has a great deal of value as a moderator of the house temperature. The concrete heats up and cools down slowly, and once this mass is heated to a desired temperature it remains there. With a subterranean house there is very little wind chill factor to pull heat out of the house. The cost is approximately $24 a square foot. Exterior maintenance is just about eliminated and thus increases long term cost efficiency. It is likely to be more fire proof than a conventional house, and storms leave it undisturbed. A subterranean house will be in good condition at the end of the mortgage period. In fact, one hundred years hence it should still be in use. With a subterranean design there will be very little air infiltration and thus it should be fairly easy to keep clean.

In trying to finance this project I first approached the Federal Land Bank. I went because I am in their major lending area -- the rural area, and felt there was a lot of sites in rural Western Montana that are adaptable to hydroelectric.

After my disappointing try with the Federal Land Bank I went to other banks in the area. They all just said no. Now in all honesty the first reason they said no to me was because I was outside their lending area, I was out in the country. But I asked them if I were to build it in their lending area would they finance it. Again the answer was a flat "no." The reason given by the banks was that they would have to use their own money to finance and they would not be able to market the mortgage. They called it a high risk venture. That was typical of all the banks' responses. I also tried the Savings and Loan institutions. Their response was that they would be reluctant -- meaning no -- to finance it. Knowing no other private sources in the lending area to try, I came to the conclusion that I am not going to finance it unless I get money from some kind of governmental program. To this end I called more people than I could even remember; for example, I called the Governor's Office, the Montana Department of Housing, the Montana Department of Natural Resources. I must say they were all sympathetic but didn't have any money for my type of problem and could do very little. I then turned to HUD in Helena and I met with them to review the plans. Subsequent to this meeting, I got a letter back from HUD with a list of ten items that I would have to include with the plan before it was approved. They also made it known to me that from that point on I could not deal directly with them but must work with a financial institution. The second letter from HUD really upset me: They said "Public power is required, an individual power plant is not eligible for FHA mortgage insurance." At that point I made phone calls to FHA in Washington, D.C. I asked them why public power was required. They were very nice and said they would check it out and get back to me. They called and stated that they found no place where public power is necessarily required. All that is required is a reliable system and they doubt whether a hydroelectric system is reliable. I

don't know if they have told that to the Corps of Engineers yet.

EDITOR'S COMMENTS:

The above portion of Terry Savage's testimony vividly portrays the frustration and disappointment of an individual interested in financing a superbly designed, energy efficient home with a reliable alternative renewable energy system. The lending institutions must begin to examine clearly their lending policies and make an honest effort to challenge some of the old traditional banking philosophies; obsolescent practices in an era of an energy crisis can ultimately harm everyone.

VI. How a Solar System Works by Kye Cochran and Dana Gunderson

I (Mr. Gunderson) work for the Department of Natural Resources which manages the Montana Renewable Demonstration Program. That program was established to provide grants to people so they could build solar homes to show they do work and to get some idea of costs involved and the efficiencies.

Basically there are two kinds of solar collectors, liquid and air systems. Probably the best way to view a collector is just like a car that is parked with the windows rolled up and imagine that it is 90 degrees outside. It would be much warmer inside the car than the 90 degrees outside. A solar collector works exactly on the same principle. Sunlight penetrates through glass and is reflected back at lower wave lengths which the glass won't allow to pass. So you get heat built up inside your car and the same applies to the inside of the solar collector.

Liquid collectors generally are more expensive than air collectors, although there are numerous tradeoffs. With the water system there are corrosive problems as well as freezing, but liquid collectors have higher efficiencies than air collectors. You could have dust in air systems that will be deposited on the black absorber plates making them gray instead of black with loss of efficiency. Air systems do not freeze but have to move a lot of air to transfer the same amount of heat

compared to a water system, meaning large areas set aside for ducting. Water per unit volume can absorb more heat than air.

Your total heat load which can be supplied by a solar heating system can be 40-60 percent in Montana. These figures vary according to the house, life style of the people, insulation factors, the solar system used, etc.

I (Kye Cochran) would like to stress that a solar system will not work in any building unless the building is well insulated. Also, a passively designed building (allowing the sun to naturally heat the interior of a building through large south-exposed windows) will greatly reduce the required heat level.

The diagrams on pages 25-32 portray the basic active and passive solar concepts.

VII. Problems Associated with Solar and Conservation Investment Appraising in Residential and Commercial Buildings by Jack Moore:

JACK MOORE:

The appraiser looks at solar property no differently than he does other property for which he has been asked to determine the value. An appraiser is going to analyze the basic appraisal problem, defining what the problem is and going out to the site to see that it is the best use of the land.

Solar homes do not have to look like a chickencoop. If you get a chance when you are going through Boulder, Montana, look at Dr. Pallister's new home which is about a mile south of Boulder. The design of that home might not appeal to you; but does every home design appeal to you? This home is quite conventional with the solar collectors in the gables. But the aesthetic from the appraiser's standpoint is there. A solar home doesn't have to be something way out; it can be tastefully done. The appraiser has to consider the design and this must be part of his thinking.

The cost approach in residential or commercial building is one basis which the appraiser would use. The income approach to commercial property with solar installation is going to show a savings in utility charges which will affect the appraisal.

A more favorable interest rate is going to affect the appraisal as well as tax breaks. If the taxes, utility costs, and interest rates are low it is going to give you much greater net income assuming that the property is rented at a fair economic rent. This will make a considerable difference when it is capitalized out. The more favorable the interest rate, the higher value can be reflected to the property. So the appraiser had better be aware of the tax incentives and the rest of the considerations I have mentioned.

The design of the whole house is what counts. It all has to integrate together. In our office we have had a total of fifteen appraisals made on solar projects. Three years ago we had none. Two years ago we did five -- this year we have done ten of them. The total number of appraisals as compared to the total volume in our office is less than one-half of one percent. I have asked myself several times if the volume is so low why in the world am I spending my time running around to Spokane looking at solar? To Great Falls looking at solar? Why get involved in solar? It is because I feel that the appraiser who is not doing this and is not trying to keep up with the times, will find himself in the Model T era. Surveys, predictions, etc., that we read tell us we are looking at a whole new method of heating a home. It is the biggest transition in the building industry that has come about for a long time. The change from plaster walls to sheetrock walls, the change from one pipe to two pipe hot water systems, or the old coal-wood burning space heater to a central system, the change from the one steam valve to automatic pnuematic controls, individual room controls -- all came about in gradual stages. Solar is coming much faster. It is going to make a turn around in the next five or ten years. We are moving into an era that is rapidly changing -- the technology is changing all the time and that is where we are having some problems in the appraisal field -- trying to keep up with the technology. HUD has recently published intermediate minimum property standards for solar that will help. This is probably the best thing that has happened. We no

longer have to make appraisals following the rationalization process.

An appraiser is trying to make a living as an appraiser. He doesn't have time to just go out and spend time searching. We need some summaries of what is pertinent for the appraiser, what is pertinent for the lender, and get it out to use. I would like to see seminars -- one day -- half day -- or whatever for appraisers to educate them in solar and what we are to expect.

Question: Of the ten systems you appraised were they hot water or air?

Eight of them were water systems and two were air. The air systems were in conjunction with a heat pump. One of the homes was designed by a solar engineer -- Jim Taylor on the northside of the Helena valley, which is an ideal location for solar. Then there is the Serendipity Apartments -- 42 units -- which is located in downtown Helena with solar collectors on the roof.

VIII. Solar Installation Lending Concerns in Montana by Mike Elder:

There was a form sent out -- a survey -- to the lenders in the state asking them several questions as to whether or not they had made loans for solar homes. Thus far 23 known loans have been made in the state. Some of the information asked was: Should the different agencies (SBA, FHA) get involved in guaranteeing or funding loans, would the lenders be interested in supporting the loans and participating in the programs. Between 83 and 90% of the respondees did give an affirmative response to involvement by these agencies. However, one agency that was overlooked is the PMI Company. This is the company we will go to when an individual comes in and says to us "I have only 10% to place down on my total costs." when generally federal regulations require most lenders to have at least 20% in order to have adequate coverage on our exposure in return for the investment. If anything goes wrong, we at least would have leeway where we can sell it and not lose our shirts.

Mortgage Guarantee Insurance corporations are now very much into solar and other forms of renewable energy as far as backing them. If you would have a 60% loan to

value ratio or cost ratio you could insure it with them.

A big concern of lenders is to be aware of the cost of solar to people and try to help them to get into solar. Peter Sardagna of San Diego said that he felt it was necessary for a lender, if they were going to be interested at all in making solar loans, to be an active and not a passive lender. If you are going to get into it you need to designate at least one person to get in and identify who the contractors are, who are the manufacturers, whether or not they are effective, what procedures and criteria you need to make these loans and keeping yourselves abreast of changes in the industry. The informational system is going to have to be improved upon in order for all of us to adequately determine if a solar unit is good and whether a back-up system is installed. Also performance data is lacking on many of the systems.

What dollar values do you hang on a $5000 initial cost for a solar system when the next guy comes in and sees the solar collector up there and is not interested in an energy efficient home, when he feels solar detracts from the aesthetics. But this does not necessarily need to be the case in a well-designed system. Life cycle costs is something that we at American Federal have not yet considered, but now since energy efficiency or the ability to keep fuel costs down has become more pronounced, we must began to take this into consideration. Recently, because of a state program in FHA-VA type loans I found it was necessary to take into consideration the cost of utilities, the cost of maintenance and I begin to realize why it is a very important factor. I think that the majority of lenders in Montana are interested in obtaining information on materials and contractors and if possible it might be effective for the state to disseminate this information; or we (lenders) may decide it is more feasible for us to do it on our own.

Minimum building codes need to be established by someone. Peter mentioned earlier that he has a minimum requirement of 10% return before he can make a loan. We need to establish similar criteria.

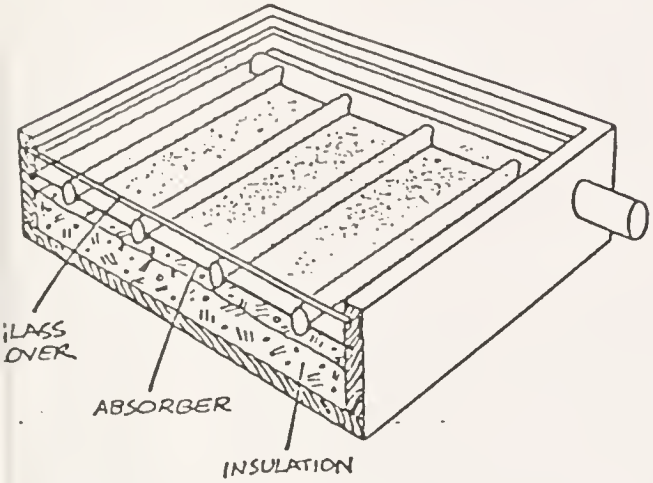
We (American Federal Savings and Loan) have made two loans, both of them on new construction, and one is about 50% complete. Therefore, we don't have the operational information. This is where most of us are at in Montana banking especially in the area of new construction.

There are two basic types of solar systems:

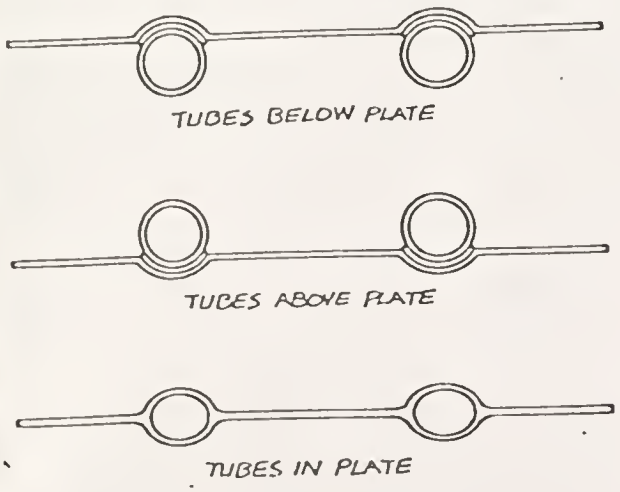
Active or indirect systems collect heat by means of solar collectors, and transfer the heat by means of pumps, ducts, pipes, etc. to a storage medium. When heat (or hot water) is needed, it is brought from storage to the point of need.

Passive or direct solar systems collect and store sunlight without the use of hardware such as collectors, pumps, and motors. Following are some examples of the two types of systems.

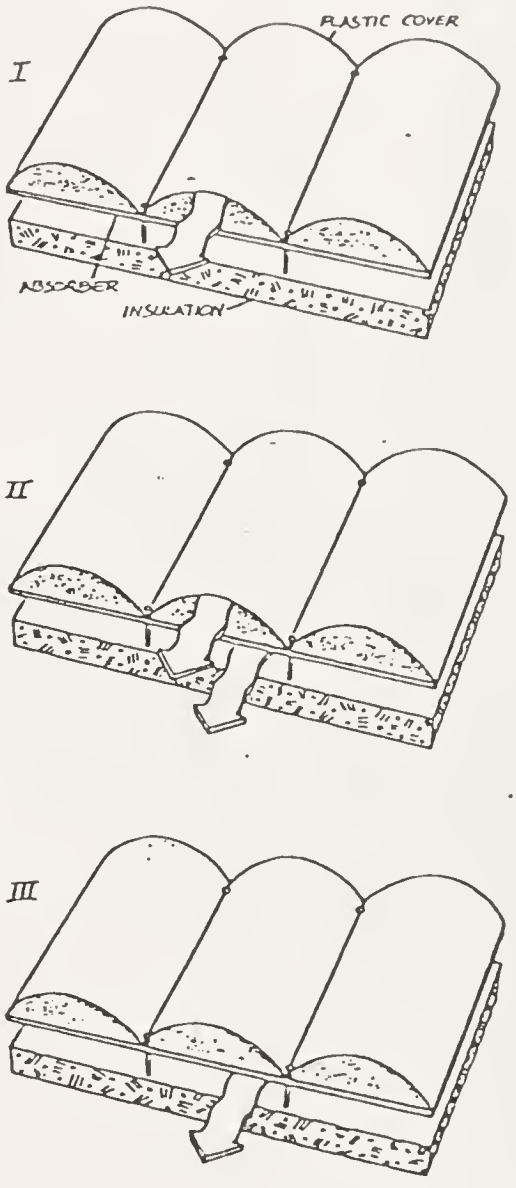
ACTIVE
or
INDIRECT



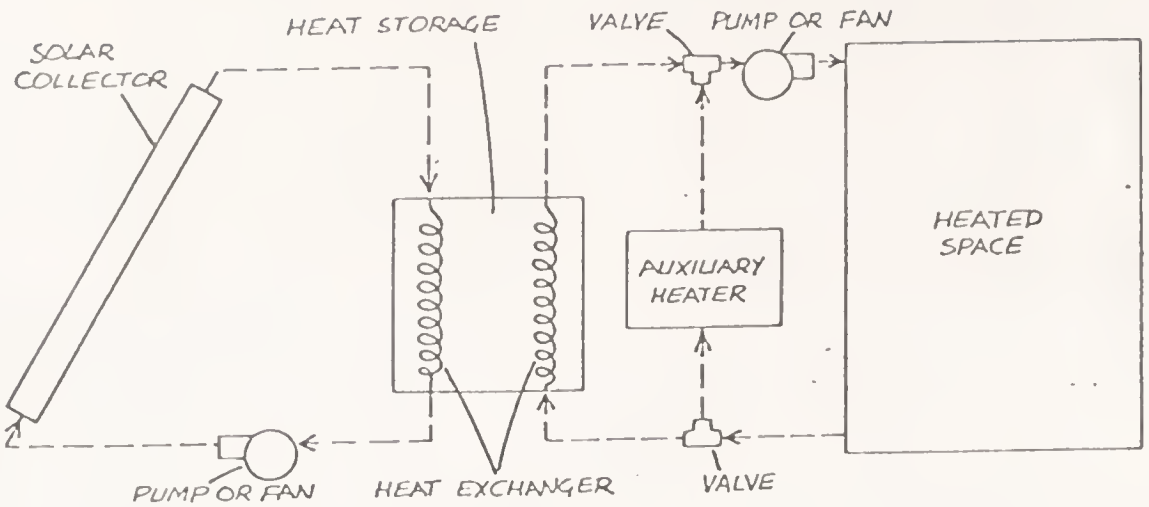
A liquid-type flat-plate collector.



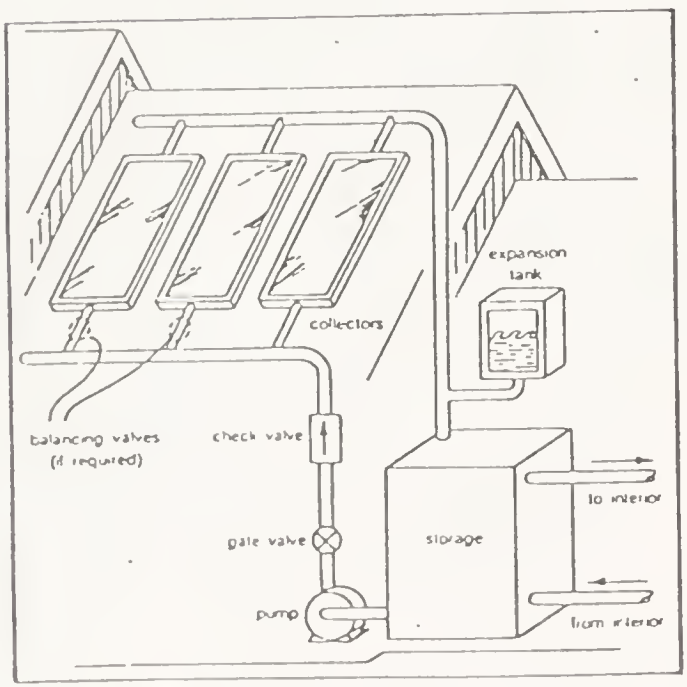
Tube-type absorbers—three possibilities.



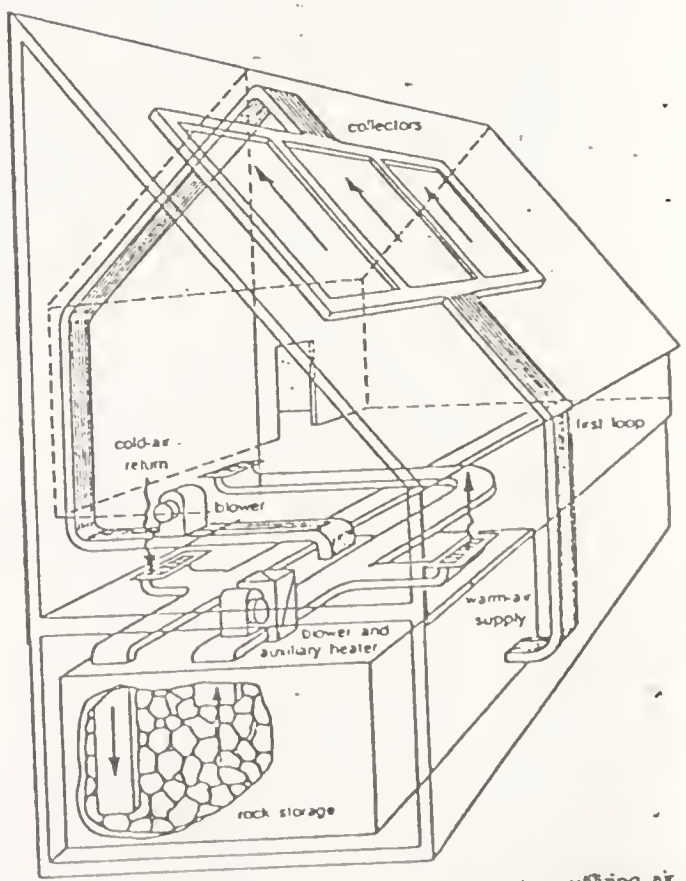
The three types of warm air solar collectors.



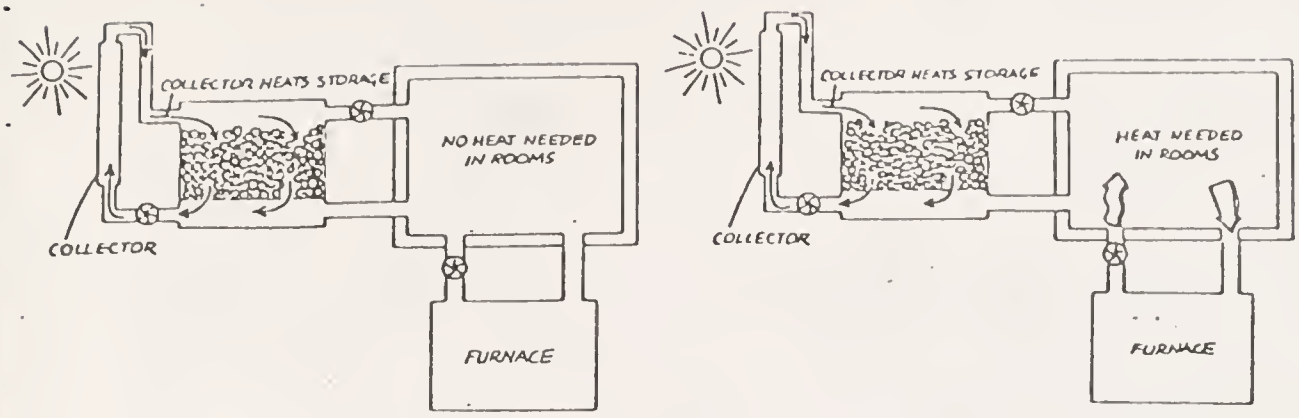
Basic components of an indirect solar heating system. There are two primary heat transport loops—from collector to storage and from storage to the rooms.



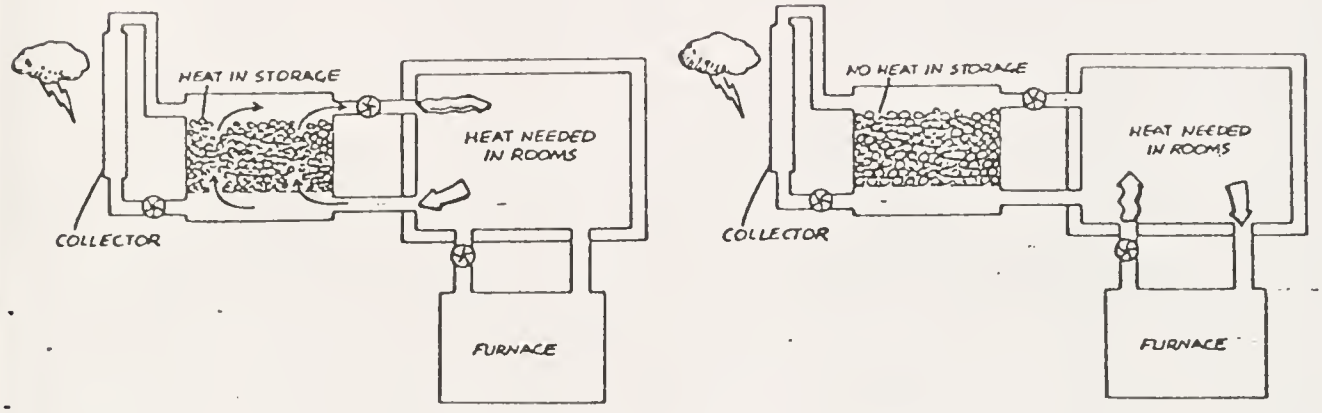
Details of a first-loop circulation system using water.



A schematic for a solar heating system utilizing air.

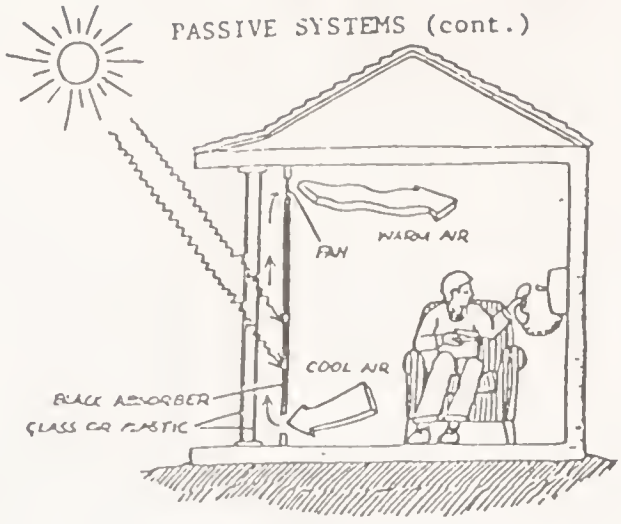


When the sun shines, the collector heats the storage. The furnace heats the rooms when necessary.

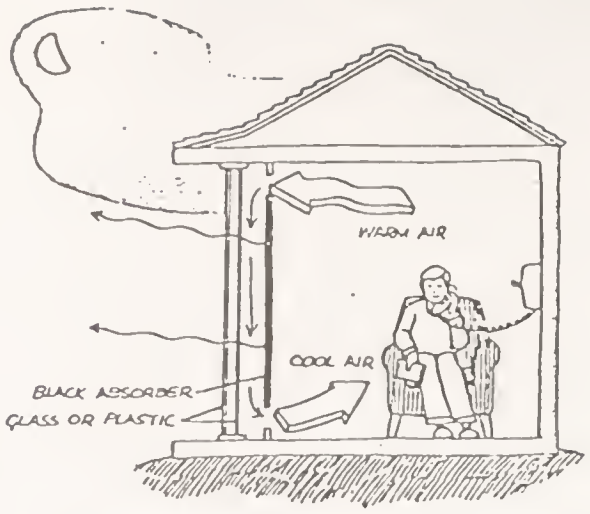


When the sun isn't shining, stored heat is delivered to the rooms as needed. If there is no heat in storage, the furnace comes on.

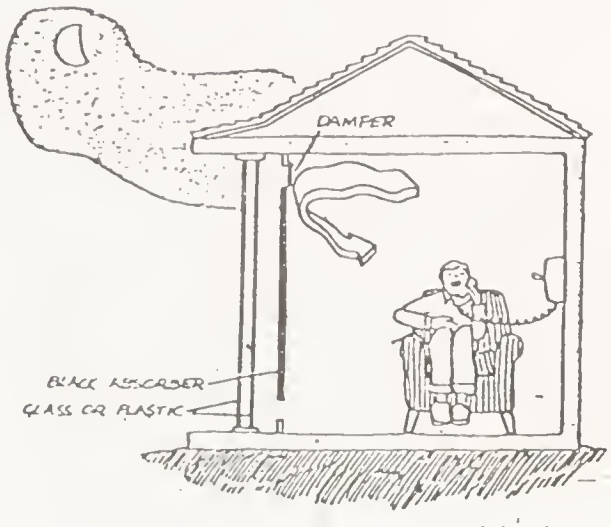
COMPONENT OPTIONS FOR INDIRECT HEATING SYSTEMS		
Collector Fluid	Heat Storage	Heat Distribution
air	rocks or gravel	gravity convection
	small containers of water	forced convection
	small containers of phase-changing salts	air-fed radiant panels or concrete slabs
water	large tanks of water or other liquids	baseboard radiators or fan-coil units
water-antifreeze solutions	large tanks of water embedded in rocks or gravel	water-fed radiant panels or concrete slabs
oil and other liquids		forced convection past water-to-air heat exchangers



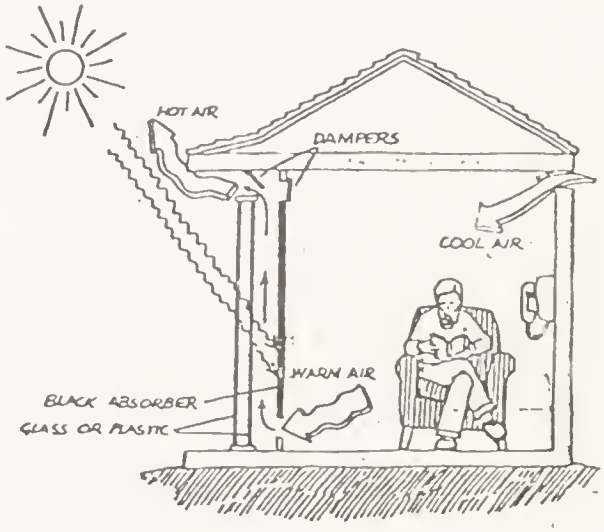
Added fan provides heat control.



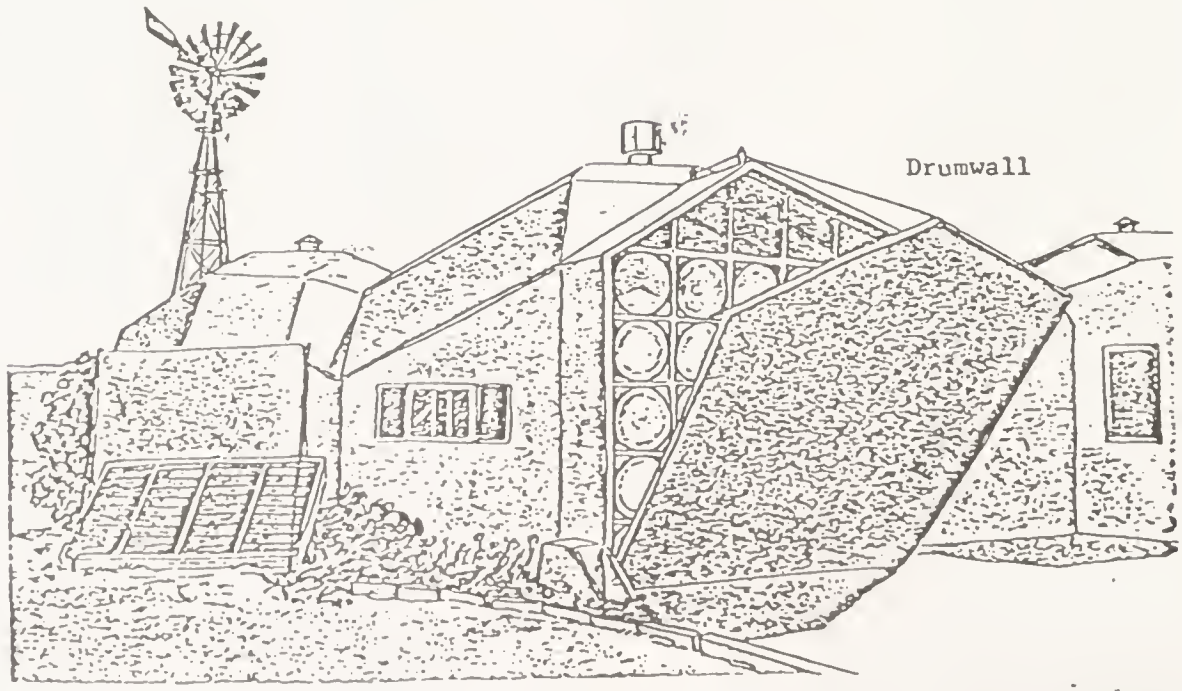
Reverse thermosiphoning cools the room.



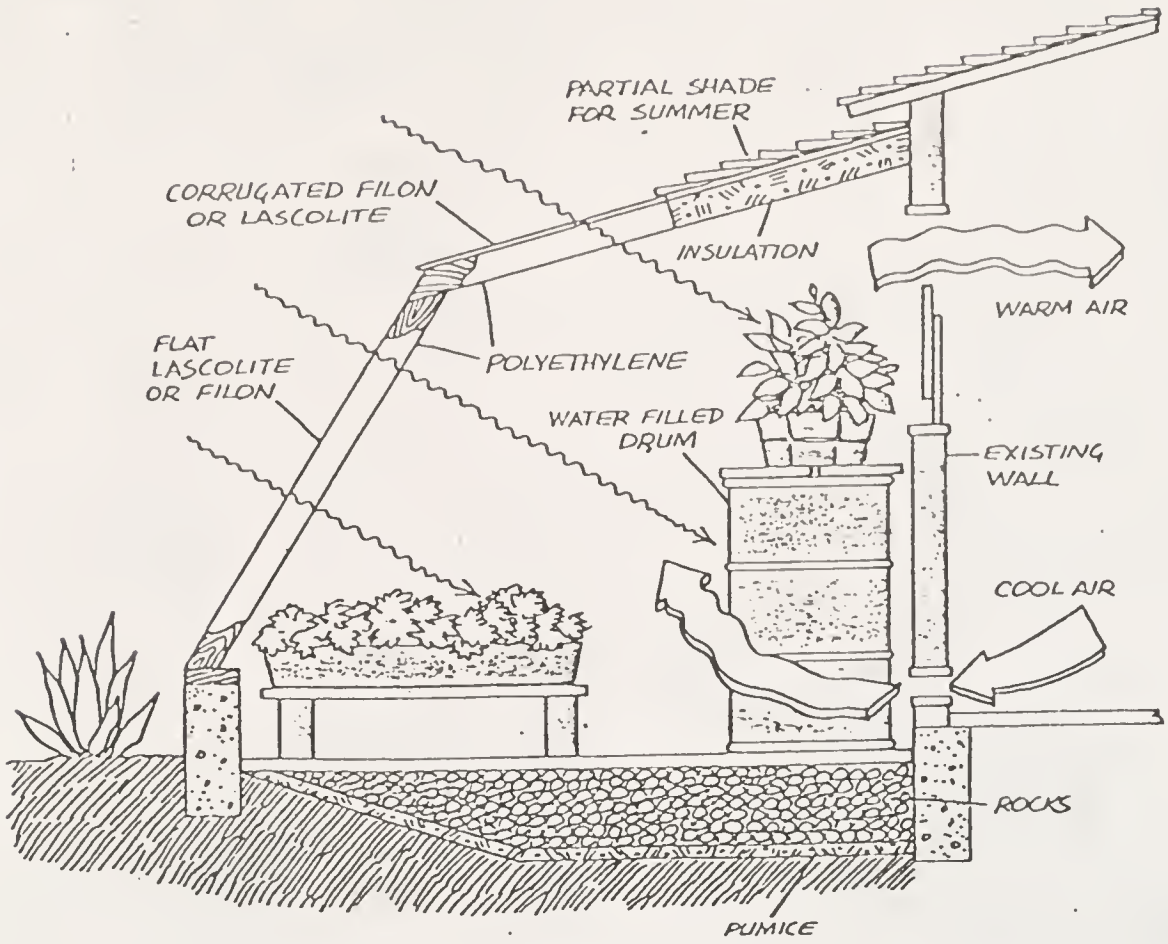
Damper prevents reverse thermosiphoning.



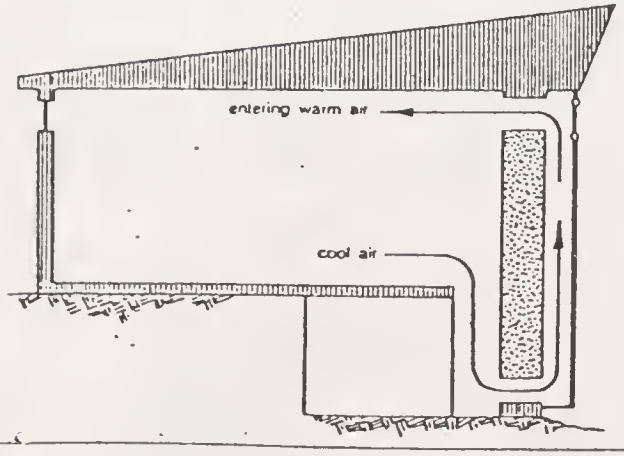
Chimney effect induces natural ventilation.



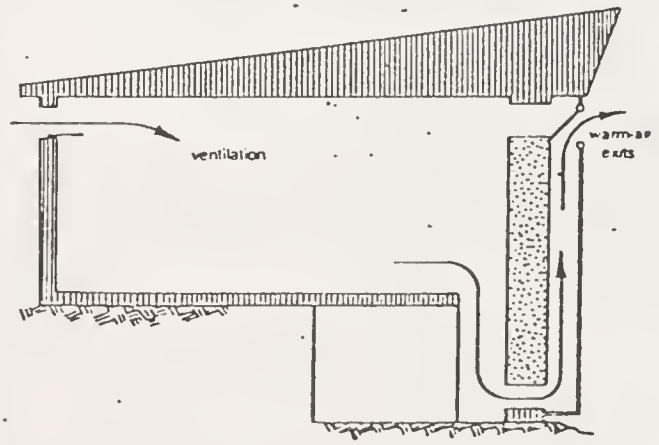
Southwest view of the Baer House in Corrales, New Mexico.



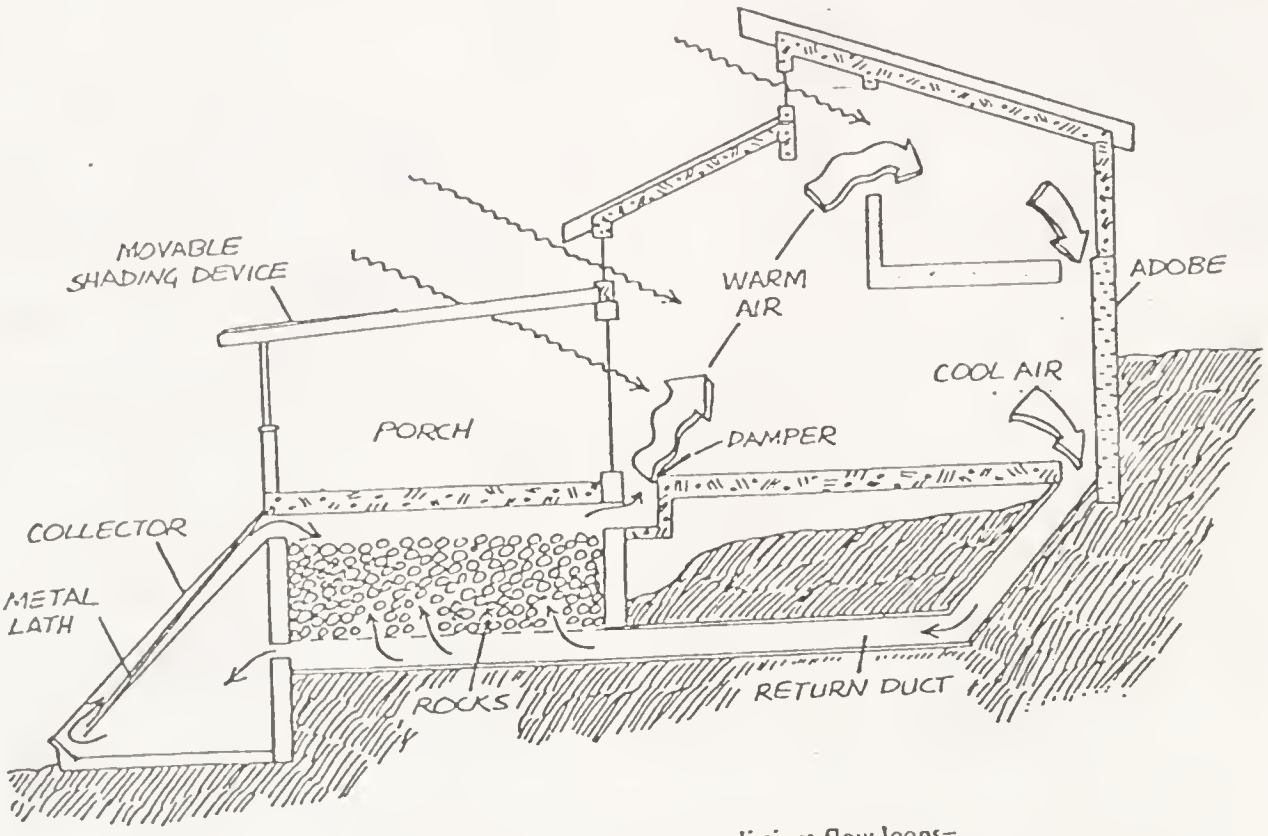
Cross section of Solar Sustenance Project greenhouse—daytime operation.



Trombe Wall: Winter



Trombe Wall: Summer



Solar heating system in the Davis House. There are two distinct flow loops—collector-to-storage and storage-to-house.

Diagrams and pictures used on these pages are taken from two excellent books on solar energy:

The Solar Home Book,
by Bruce Anderson.
$7.50 from Cheshire Books,
Harrisville, NH 03450

Other Homes and Garbage,
by Leckie, Masters, Whitehouse and Young.
$9.95 from Sierra Club Books,
530 Bush St., San Francisco,
California 94108

ATTENDANCE

ame	Address	Business	Representing
1 Leonard Bronder	Denver, CO	Research	SPOW
2. Michael Elder	Helena	Savings & Loan	American Federal
3. John T. Keith	Kalispell	Banking	First Northwestern
4. Terry Savage	Lolo	Real Estate	Self
5. Bill Delp	Noxon	Hydro-Electric	IPD, Inc.
6. Michaela Syne	Bozeman	Appraiser	Self
7. M. L. Morton	Sante Fe, NM	Energy Resources	NM Energy Resources
8. Bill Low	Fort Harrison	Loan Guaranty	VA
9. Phylis Somers	Fort Harrison	Loan Guaranty	VA
10. Al Olson	Fort Harrison	Loan Guaranty	VA
11. Peter Sardagna	San Diego, CA	Savings & Loan	San Diego Federal
12. Randy Moy	Helena	Solar Coordinator	Montana Energy Office
13. T. Joe Biehl	Helena	Banking	Home Federal Savings
14. Larry D. Geske	Great Falls		Great Falls Gas Co.
15. Don Inman	Helena		FHA
16. William C. Paullin	Kalispell	Banking	First Federal S & L
17. Gary Ryan	Kalispell		Jacobson & Ryan
18. Michael L. Schara		Carson Co., Inc.	Carson Co.
19. Ronald J. Iverson	Helena	Insurance	State Farm Ins.
20. Eileen Shore	Helena		EQC
21. Steve Perlmutter	Helena		EQC
22. Kye Cochran	Billings		AERO
23. Chester Kinsey	Helena	Contractor	Self
24. Jack B. Moore	Helena	Appraiser	Moore & Associates
25. A. Alan Kind	Helena	Appraiser	Moore & Associates
26. Wayne Neil	Bozeman		
27. Frank Smoyer	Helena	CPA	MERDI
28. Jim Thompson	Deer Lodge	Banking	Pioneer Fed. S & L
29. Robert Mastranrea	Great Falls	Banking	Federal S & L
30. Gary Wallace	Great Falls	Banking	Great Falls Fed. S&L
31. Jack Lovell	Missoula	Banking	Western Federal
32. Bob Quam	Helena	Realtor	Self
33. Donald L. Richard	Helena	News	Self
34. Bob White	Missoula	Appraiser	Self
35. Dana Gunderson	Helena	Engineer	DNR
36. Emil P. Eschenburg	Helena	Realtor	Self
37. Clarence H. Hewitt	Great Falls	Banking	First Federal S&L
38. Jan Konigsberg	Missoula		Montana Energy Office
39. Jon A. Krutar	Helena	Economist	Self
40. Mike Fitzgerald	Helena	Commerce	Governor
41. Gary Kjensrud	Great Falls	Banking	Montana Bank
42. Douglas C. Allen	Great Falls	Banking	Northwestern Bank
43. Craig N. Hollen	Bozeman	Banking	Ist National Bank
44. James Whitehead	Helena		Lt. Gov.'s Office
45. Pietr G. Zwolle	Great Falls		Opportunities, Inc.
46. Jim Parker	Helena		
47. Dick Zier	Miles City	Banking	First National Bank
48. Dave Zieck	Billings	Banking	First Federal S&L
49. Jim Grunert	Billings	Banking	Second Fed. S&L
50. Jim Whitbeck	Billings	Banking	Midland Bank
51. Bill Stevens	Billings		Bill Stevens & Assoc.

Name	Address	Business	Representing
52. R. W. Richardson	Billings	Banking	First Federal
53. Bob Kiesling	Helena		EIC
54. Richard H. Geissler		News	Lee Newspapers State Bureau
55. Bob Creek	Great Falls		Great Falls Gas
56. Sanna Porte	Helena		EIC
57. J. Lee Cook	Helena		Montana Energy Office

AGENDA FOR FINANCIAL WORKSHOP
Capitol Building, Room 413
November 15, 1977

Time	Item	Description
10:00 a.m. - 10:30 a.m.	Registration	Film: "Solar Energy Ready When You Are"
10:30 a.m. - 10:35 a.m.	Welcome	Lieutenant Governor, Ted Schwinden
10:35 a.m. - 10:40 a.m.	Workshop Moderator Quick Review of Workshop Schedule Introduction of First Speaker	Larry Geske, Executive Vice President, Great Falls Gas Co.
10:40 a.m. - 11:20 a.m.	Solar Equipment Technology Re: Financing Installations	Bruce Wilcox, Partner, Berkeley Solar Group, Berkeley, California
11:20 a.m. - 12:00 a.m.	A Banker's Approach to Solar Lending	Peter Sardagna, Assistant Vice-President, San Diego Federal Savings and Loan
12:00 p.m. - 1:00 p.m.	Lunch	No Host Luncheon, Village Inn Pancake House
12:30 p.m. - 1:20 p.m. (Presentation during lunch)	A Private Citizen's Problems in Financing the Solar Home of His Own Construction	Terry Savage, Lolo, Montana
1:00 p.m. - 1:20 p.m.	How a Solar Heating System Works - Components - Life - Savings	Kye Cochran, Founder & Director of AERO & Dana Gunderson, DNRC
1:20 p.m. - 1:40 p.m.	Problems Associated with Solar & Conservation Investment Appraising in Residential and Commercial Buildings	Jack Moore, Jack Moore & Associates, Helena, Montana
1:40 p.m. - 2:00 p.m.	Solar Installation Lending Concerns in Montana (Conventional, VA, FHA, Second Mortgage & Home Improvement Loans)	Michael Elder, Loan Officer, American Savings & Loan Association
2:00 p.m. - 3:30 p.m.	Work Groups (30 minutes each, break into groups of 1/3 of delegates in each work group, change groups every 30 minutes, discuss problems delegates are concerned with) Group 1 - Technology - Moderator - Kye Cochran Group 2 - Appraisal - Moderator - Jack Moore Group 3 - Lending - Moderator - Mike Elder	
3:30 p.m. - 4:00 p.m.	Closing Remarks by Guest Speakers Suggested solutions to questions that arose from each work group.	
4:00 p.m.	Adjourn	

QUESTIONNAIRE

TO: Financier

188 of these questionnaires were sent out and 95 were returned. Below are the number of responses to each question.

Montana is presently developing a solar plan for the State as part of Western Regional Solar Planning Effort. One area of particular concern is the reluctance on the part of financial institutions to make loans for renewable alternative energy systems in homes. One of our purposes is to try and identify financial barriers that deters renewable energy development, and then to formulate programs to resolve these barriers. But before we can do so, we need to better understand the problems. The results of this questionnaire will be discussed during a workshop scheduled for the first week of November and attended by a small number of Montana financiers. Your immediate response to this questionnaire would be greatly appreciated.

1. How many loans have you made for renewable energy systems:

   a. solar energy systems 23 (see attached)
   b. wind energy systems none
   c. hydro energy systems none

2. How many loan applications for renewable energy systems have you disapproved:

   a. solar energy systems none
   b. wind energy systems none
   c. hydro energy systems none

3. Would you make loans for alternative energy systems if the following agencies guarantee the loans:

	Yes	No	Don't Know
a. Small Business Administration (SBA)	78 (82%)	4 (4%)	13 (14%)
b. Federal Housing Administration (FHA)	77 (81%)	3 (3%)	15 (16%)
c. Economic Development Administration (EDA)	49 (52%)	18 (19%)	28 (29%)
d. Veterans Administration (VA)	73 (77%)	8 (8%)	14 (15%)

4. Would your financial institution display renewable energy information to encourage home owners to install renewable systems:

Yes	No	If no, why?
92	3	

5. In reference to question 2, please note the primary deterrants that discourages financial institutions from lending to people who desire to build homes with renewable energies with or without conventional backup energy systems.

   High Front End Costs: 18; Reliability of the System: 9; Lack of Information: 10; Appraisal Problems: 10; Zoning Problems: 1.

Please return this questionnaire to: Montana Energy Office, c/o Lieutenant Governor's Office, Capitol Station, Helena, Montana, 59601

Name: _____

Address: _____ Zip: _____

Phone: _____

FINANCE QUESTIONNAIRES

RETURNS

As of 10/27/77

Loans made for renewable systems by banks: 23

Geographic Distribution:

Billings	
1st Citizen Bank	1
1st Federal Savings & Loan Association	3
Ist Northwestern National Bank	1
Security Federal Savings & Loan	2
Helena	
American Federal Savings & Loan	2
T. Joe Biehl	2
Great Falls	
Ist Westside National Bank	2
Bozeman	
Ist National Bank	3
Havre	
Havre Federal Savings & Loan	2
Missoula	
Ist Federal Savings & Loan	2
Kalispell	
Ist Federal Savings & Loan	1
Laurel	
Yellowstone Bank	1
Lewistown	
Northwestern Bank	1
	23

MINUTES OF THE MEETINGS: MONTANA SOLAR PLANNING COMMITTEE

SECTION J

MONTANA SOLAR STEERING COMMITTEE

Minutes of the Meeting, August 9, 1977

Location: Lewis and Clark Library

Participants: Randy Moy, Montana Energy Office
Terry Wheeling, MERDI/NCAT
Eileen Shore, EQC
Gus Percha, Solar Designer
Jim Parker, Center for Social and Environmental Concerns
M.E. Noble, HRDC
Gene Leuwer, HRDC
John Nichols, Lewis and Clark Library
Joe Lamson, Northern Rockies Group
Jim Whitehead, Lt. Governor's Office
Robert Hall, Lt. Governor's Office
Leo Belanger, MERDI, Center for Innovations
Mike Fitzgerald, Governor's Office of Commerce
Gerry Knutson, Dept. of Natural Resources
Kye Cochran, AERO
Dan Newman, Dept. of Natural Resources

Morning:

Randy called the meeting to order at 9:00, and passed out written material which included:

1) A rundown of Montana's solar legislation; a list of possible Montana solar consultants with various types of expertise; and an annotated list of Montana groups involved with solar energy.

2) Suggested areas of representation for the Montana Solar Steering Committee (MSSC) and for a possible Montana Solar Advisory Group; a diagram showing the relationship between possible and existing Montana Solar committees, groups and offices; a diagram showing the makeup of a possible Montana Energy Commission; a list of the functions of the Contracting Person, the MSSC, Montana Solar Advisory Groups, and the Montana Energy Commission; a budget for Montana's Solar Planning Effort (in response to the Western Region Solar Planning Effort); a listing of the activities required of Montana by the Western Regional Solar Planning Effort, and of benefits Montana might achieve through these activities.

3) The 7th "newsletter" sent out August 4th by the Western States Solar Planning Committee.

4) A description of the Montana Energy Office's proposed Energy Information Clearinghouse.

5) A rundown of ERDA's proposal that Montana sponsor mini-conferences in September to sound out people's feelings on energy matters.

6) A listing of possible information to be included in a proposed Montana Solar Directory.

7) A tentative agenda for this meeting.

Randy gave the Committee a rundown of the events leading up to the appointment of this Committee. He explained the appointment of Dr. Joseph Horvath as Contract Person for Montana's Solar Planning Effort. This appointment was made by Lieutenant Governor, Ted Schwinden, and Randy Moy, Montana Energy Office. We discussed the roles and authority of both the Committee and Dr. Horvath. Both authority and role remained somewhat nebulous, partially because we had not yet received from the Western Regional Solar Effort's RFP, which is to help define what is expected of us. Jim Parker felt strongly that Dr. Horvath should be in a "staff" position, but should be an equal member of the group (i.e., the Committee).

Dan Newman gave us a description of the proposed Montana Institute of Appropriate Technology, and its ranch location. We discussed possible roles the Institute might play, and how they could be integrated into the State Solar Planning Effort.

We discussed the proposed "Solar Directory" and concluded that such a booklet would be essentially an expansion and updating of the Montana Renewable Energy Handbook. Jim Parker suggested that perhaps the Handbook is sufficient reading matter, and that we should instead produce a movie, TV show, or some similar form

of media presentation.

We elected Jim Parker Chairman of the Committee, and Kye Cochran volunteered to take minutes of meetings.

We discussed possible already-scheduled conferences in September to which we might attach ERDA's suggested "mini-conferences". Possibilities included a meeting in Helena of the League of Cities and Towns, and the Trades Fair in Billings. Jim also suggested combining a visit of the New Western Show to Butte with a mini-conference. We concluded that all were appropriate except the Trades Fair.

We defined six sub-tasks, each to be carried out by one or more members of the Committee:

1) Determination of the make-up of Dr. Horvath's contract.

2) Determination of possible members for the proposed Montana Solar Advisory Group.

3) Compilation of a list of possible Interest Groups (for whom to hold educational workshops) and determination of important members in each interest group.

4) Identification of events in Montana scheduled for September which might allow the addition of one of ERDA's mini-conferences.

5) Review of possibilities of the Solar Directory.

6) Integration of proposed solar information systems to avoid overlap and confusion.

We decided to send Jim Parker and Dr. Horvath to the bidders' conference on the 18th of August, assuming that we are allowed to send two people.

We discussed money flow and Randy Moy advised us that money for this project goes from Solar Planning Office-West (SPO-W) to Lt. Governor's Office to Randy to whomever.

Afternoon:

Participants: Jim Parker, Eileen, Terry, Gus, John, Randy, Leo and Kye.

Each person discussed his/her background, interest, expertise and experience regarding solar energy with the rest of the remaining Committee.

Randy advised us of his lunchtime phone call to Carl Benson of ERDA's Regional Office in Idaho. Mr. Benson said he would check out money possibilities for the mini-conferences.

We discussed possible additions to the MSSC membership, and decided that we would like to add:

1) a solar manufacturer

2) a utility representative

3) a university representative

4) a representative of organized labor

5) a banker/appraiser

Various members of the Committee took it upon themselves to contact the persons suggested.

Jim Parker offered to invite some of Montana's congressional delegation to our next meeting.

Terry Wheeling suggested that we invite a person from the staff of the Western Regional Planning Office to attend and address our next meeting. Randy agreed to do this, and to invite Binns, who works at the National SERI in Colorado.

We agreed to meet next on the 19th of August, again at Lewis and Clark Library at 1:00 P.M.

MONTANA SOLAR PLANNING COMMITTEE

Minutes of the Meeting

August 19, 1977

Present: Jim Parker, Dr. Charless Fowlkes, Dr. Joseph Horvath, Terry Wheeling, Eileen Shore, Gene Leuwer, Jerry Toner, Gus Percha, Dana Gunderson, Larry Geske, Nelson Anderson, Jim Whitehead, Paul Cartwright, and Randy Moy. Sitting in were: Ellyn Murphy and Bob Richards of the New Western Energy Show.

We first introduced Jerry Toner, giving some background on the Montana Energy Conservation Plan produced last winter by MERDI and Ecotope Group. He expressed hope that this Planning Committee will be able to help out with the implementation of some of the suggestions offered in that plan.

Jerry Toner is in charge of implementation, according to FEA edict, of the Energy Conservation Plan. He told us that the funds that have been received for implementation were categorized by the FEA, and were principally allocated to the 5 "big Payoff areas" that FEA originally mandated each state to address. These areas are:

1) Thermal efficiency standards
2) Right turn on red (not needed in Montana)
3) Public transportation
4) Lighting efficiency standards
5) Procurement practices

Jerry discussed the areas that are being addressed by the Montana Energy Office. They include:

1) Building codes. A state building code which emphasizes energy efficiency

is being drafted. When this is passed, the state will begin training code inspectors and other inspectors who are keyed to the energy effort. First draft of the code should be out by September 30.

2) Procurement. They're doing a survey of the state purchasing system and are contemplating devising a computer system to handle procurement procedures.

3) Energy auditing. They're putting together an energy auditing procedure and will try it out first on Lewis and Clark County buildings.

4) Public awareness. They're working on promoting public awareness of carpooling and vanpooling, and the 55 MPH speed limit.

5) Public utility measures. They are working with the Public Service Commission to develop a system for commercial utility users.

We discussed in more detail the concept of energy auditing. Jerry told us that the Energy Office is developing three types:

1) Class A: The maxi-audit. For architects, engineers, probably costing several thousand dollars. With computer printouts, etc.

2) Class B: Mini-audit. One-two hour walkthrough by people with expertise. Costs a lot less.

3) Class C: Self-audit. Not expensive. For the homeowner.

They will be developing a manual to be used with all three of these types of audit. Writing up of the manual will be let for contract.

Terry Wheeling asked how much money we have to work with. Jerry said $159,000 for 1977, and probably double that ($320,000) in 1978.

We discussed what changes they might be suggesting for the codes, and Jerry doesn't yet know exactly what these changes will be. They had orginally thought to go along with the ASHRAE 90-75 standards, but have changed some from that inclination. Kye suggested that they may be looking at a possible BTU allowance per square foot per day, and Jim Parker reminded us that Ivan Payne of MSU did a study on that concept several years ago.

Jim Parker then introduced Dr. Joseph Horvath. Dr. Horvath talked with us about his background and his hopes for this Committee. We discussed requests for planning proposals issued to the western states by the Solar Planning Office-West (SPO-W), and Jim Parker expressed the hope that we would have formed a response to the four required subjects in the RFP by mid-September, and then could go ahead and fill out the information needed soon after that. The four required subjects:

1) Identify the solar energy resources, capabilities, and needs and give the status of solar energy activities within the state.

2) Determine an initial set of state priorities, together with supporting rationale for activities directed to encourage solar energy applications.

3) Identify and discuss the existing and anticipated deterrents to and desirable incentives for expanding the use of solar energy.

4) Recommend programs to reduce or eliminate deterrents and to implement incentives for solar energy applications. Recommended programs may be statewide, regional or subregional in nature.

Dr. Horvath remarked that ERDA seems to realize that there's a lot going on and that it should be coordinated. This plan, he suggested, could be a major door-opener. We should link together all solar-oriented work going on in the state, and by December 23 we should have something for SPO-W to send to Washington, D.C.

First, said Dr. Horvath, we will organize the supply areas. We will identify all the groups, organizations, engineers, architects, developers, etc., who are doing something with solar energy. We'll do this from a grassroot, local level. Dr. Horvath and an assistant will go around the state pulling together people and resources, and finding out -- as far as possible -- everything that is going on. Small inventors, tinkerers, etc., everyone will be included.

Second, we will find out where we can best develop solar resource with the

least money.

Third, we will disseminate the information in the most effective way possible. Dr. Horvath mentioned a possible Solar Directory, and also said that we should develop a 5-year plan.

Dr. Horvath stressed the importance of small businesses to the solar effort, and said that he had talked with John Cronhol, of the USDC Small Business Administration. John expressed interest in helping people with solar business inclinations. His address is: 618 Helena Avenue, Helena, Montana, 59601.

A remark of Dr. Horvath's: "We are in the survival business. Not only solar but other as well. But the solar can help us make a start."

Jim Parker told us that the Federal Department of Energy's budget for solar energy is $350 million; 10% of that is for the regional efforts. This 10% represents 1/2% of the total budget of the Department of Energy. So we are the tail that wants to wag the dog.

Jim told us that he had asked SPOW whether our Planning Committee was supposed to develop a revenue sharing program with the federal solar people, and SPOW had said no; he asked them whether we are supposed to develop state abilities to deal with solar research and development and they said that was more like it.

A remark from Jim Parker: "The constituency for solar development is much like solar energy: diffuse and of low intensity; we're trying to develop a concentrating collector..."

We discussed data collection on what's now happening in the state and on the solar resource of the state. Mentioned were Senate Bill 86 projects, Charless's data collection of solar radiation, the Renewable Energy Handbook, the Center for Innovation, AERO members, and CAPs.

Gus Percha mentioned that we should determine and categorize the significance of data we collect, as well as simply collecting it, and Dr. Horvath agreed.

Gene Leuwer asked how long it would take to do the first data gathering. Dr.,

Horvath said that the collecting of existing data such as articles from back issues of newspapers would start very soon, and probably wouldn't take long to accomplish. The travelling to track down people and resources would be in September and October. Randy Moy said that the basic data collection would probably take a month.

We discussed the type of questionnaire we should distribute, and the method of distribution. We agreed that we should have at least two questionnaires: one for those people actually engaged in solar projects, and one for the general populace to determine people's energy needs. We discussed the need for determining the opinions and needs of groups which might have a special interest in solar energy (architects, builders, plumbers, etc.) and concluded that small workshops for these groups might be most effective; special questionnaires might be helpful too.

Dr. Horvath suggested short (one-page) questionnaires with attractive graphics. He said that such a format is the most likely to get a high return.

The need for a Montana test site for solar devices was discussed, and it was generally concluded that this is a high priority. Nelson Anderson told us that his group at Montana Tech is setting up such a site and it was remarked that NCAT is also doing something of the sort. Jim Parker determined to look into the possible coordination of the two.

Jim Parker asked what else could help determine priorites for the state. Ellyn Murphy suggested the concept of "energy committees" which is being pursued at this time by the New Western Energy Show (NWES personnel identify people in each town they visit who are interested in renewable energy matters and show an interest in being on a town "energy committee"). Dr. Horvath suggested that NWES from now on try asking people in each town certain questions, such as "how much did you know before about solar energy?" and "which of the devices you have seen on the Show would you consider using?" and which ways do you think the state can help the development of solar energy?"

Jim Parker reminded us that there's a political dimension to what we have for priorities which we have to take into account. There's no sense in setting a high priority on something that won't be of interest to legislators. He reminded us of our experience with the Energy Conservation Plan. Gene Leuwer suggested that we send a questionnaire to legislators which would include some mention of the response of the public (after we've done the questionnaire with the public, of course).

Larry Geske suggested investigating questionnaires that have been done in other states to see how they've handled the question of priorities.

We discussed deterrents and incentives, which are project #3 on the FRP. Jim Parker suggested that we can find out a lot about that through an investigation of research that's already been done. Gene Leuwer suggested that we compile all the information we can on the subject, and then hold a specialized workshop.

Jim Parker asked how we are to arrive at a recommendation of what should be funded. Randy Moy answered that this Committee will make up the recommendations, and then they will go to the Lieutenant Governor. He remarked that along with recommendations we should have identified an organization that can handle the work. Jim Parker said that recommendations of possible programs could start immediately and suggested that 15 minutes of each meeting from now on be set aside for people to suggest possible proposed programs.

Dr. Horvath asked each of us to come up with a list of at least 5 programs we would like to see proposed and send the list to him at 105 Imperial Way, Missoula, Montana, 59801. Phone: 721-1423.

Randy Moy reminded us that the prime purpose of the RFP is to come up with regional scale things. Montana's included, he said, but regional is the focus. We discussed how the region will be divided.

Dr. Horvath told us (in response to a question from Terry Wheeling on timing of this program) that the things we've discussed today will be written up and sent with Randy Moy to Albuquerque on Sunday for the meeting of planners from all the

regions.

We discussed appointing additional members to this Committee. We decided that we need someone in the area of finance and someone from organized labor. Randy Moy, Paul Cartwright, Gus Percha, and Larry Geske will work on this (open).

The ERDA mini-hearings were discussed. Randy told us that he's asked Carl Benson for around $4,425 for these hearings and he hasn't heard yet whether we'll get it. He told Carl that we'd like to extend these hearings into October since there isn't much time left to organize for September. Dr. Horvath suggested holding one of the hearings at the Montana Redworm Growers meeting in Billings on October 8. No-one else had new suggestion. Terry Wheeling suggested that we get full information from Carl Benson when he comes to Montana on the 30th regarding ERDA's solar budget; that way we can disseminate the information for people to study prior to the mini-hearings. Jim Parker suggested that we have people do editorials in the newspapers ala the Schumacher/Forbes conference. It was also suggested that we get Senator Melcher to hold a hearing on the subject in Forsyth (open).

Randy Moy suggested two organizations that might want to organize the hearings: NRAG and AERO. Kye declined for AERO, saying that they are too busy and seconded the suggestion that NRAG handle it. The Committee passed a motion to let Randy handle the appointment of an organization to organize the hearings (open).

We discussed the Solar Directory. $7,000 or so will be available to produce it if we are able to procure matching funds and we talked about whether that should go to producing the booklet or printing it. It was suggested that we might be able to get the FEA or Department of Commerce to print it (open).

The newcomers (Charless Fowlkes, Larry Geske, Nelson Andersen) were asked if they had any questions or comments. Charless said that the RFP seemed so broad that it was a bit overwhelming. "It covers everything on earth," was his comment. Nelson agreed and said, "There's such a lot to be done. So many variables. It has

to be talked out." Jim Parker remarked that the people in Denver don't seem to have any more answers than we do. Larry felt that this would pick up steam as we get into it more and figure out our priorities.

We set the next meeting for September 9, 1977, 1:00 P.M., Butte, Montana. (NCAT.)

MONTANA SOLAR PLANNING COMMITTEE

Minutes of the Meeting

September 30, 1977

Present: Jim Whitehead, Gus Percha, John Nichols, Jim Parker, Paul Cartwright Kye Cochran, J. Lee Cook.

First, Jim Whitehead reported on Larry Geske's mini-hearing in Great Falls. Forty five people attended and the presentations were interesting and informative. It was geared toward what regular people want to know (i.e., insulation, weatherization, simple solar information, etc.) and an excellent attention-getting item on the agenda was the presentation of a solar cooker as door prize.

We discussed briefly our position in relation to the Western Interstate Nuclear Board. Jim Parker reported that the money for this effort goes from ERDA to the WINB to SPOW to the 13 states; WINB is thus simply the mechanism to put the money through.

We talked about various information dissemination systems. Paul Cartwright described a proposed Montana Integrated Energy Information Transfer System to be funded by Old West Regional Commission and to be located in the State Library. It would use the existing interlibrary loan network.

We discussed what might be included in the Solar Directory which we intend to produce by March 1978, and Jim Parker expressed interest in doing some kind of TV series instead of a Directory. We agreed that both methods of communication are important in different ways, at different times, and to different audiences. Gus Percha suggested that we end the current planning effort with the publication of a Directory and kick off the implementation phase with a series of TV presentations.

Suggestions for items to include in the Directory were: the substance of the Montana Renewable Energy Handbook; the real scoop on types of hardware -- what's good

and what's not; a guide and methodology for learning how to use solar energy both as an individual and on a community level.

Paul Cartwright introduced the idea of getting TV and radio weathermen to announce (along with the usual weather statistics and prognostications) radiation and wind data, with suggestions as to how they could have been used. For instance, he could announce the amount of insolation for a particular day and then suggest a use to which this insolation could have been put (this amount of sunlight could have heated all the water for a family of four with the use of just two 4' x 8' solar panels). He could the same thing for wind: with a 2 kw wind generator, a person could have produced X amount of electricity; enough to run all his lights and the TV or whatever. We felt that this would be an excellent way to raise people's consciousness and make them realize that the weather is a resource.

John Nicols suggested that the Planning Committee come up with a list of solar books that could be bought for under $100.00 and tie this to a grant program for libraries. This would encourage all the libraries in the state to get certain basic important books. Jim Parker suggested that a local "solar group" could raise the $100.00 (instead of the planning effort's providing the money), and then the planning effort could provide PSA backup promotion for the local solar group.

We decided to hold a meeting of the Directory Subcommittee on October 13, at 7 P.M., in the Lewis and Clark Library. We held off deciding on a date for the next full committee meeting, pending consultation with Dr. Horvath and Randy Moy.

MONTANA SOLAR PLANNING COMMITTEE

Minutes of the Meeting

October 28, 1977

Present: Committee Members: Larry Geske, Randy Moy, Gerry Knudsen, Kye Cochran, Jim Whitehead, J. Lee Cook, Charless Fowlkes, Dr. Joseph Horvath, Terry Wheeling, Eileen Shore, Paul Cartwright, Gus Percha

Others: Jack Moore, Pietr Zwolle, Steve Mandeville, Dick Bourke, Anne Garde, Angie Leprohon, Bob Rasmussen, Nancy McLane, Sanna Porte, Jim Lubek, Frank Culver, Allen Lefohn, Richard Klinger, Patrick Binns, Beth Givens

Randy Moy began by reporting on the proposal produced by SPOW for the setting up of a non-profit Western Solar Regional Office. He handed out a document describing this proposed office, and remarked that there is a strong push within the 13-state SPOW to have the office located in Arizona, New Mexico, Colorado...in a state, in other words, that already has a strong solar leaning or program. Randy prefers the idea of having the office located in a less obviously solar-oriented state such as Oregon, Idaho, Utah or Nevada.

Patrick Binns, who helped Montana develop its Energy Conservation Plan last year and has since been employed at the Solar Energy Research Institute in Golden, Colorado, gave us a thorough rundown of the workings of the federal government in regard to solar energy. He showed us how the former ERDA has become integrated into the present Department of Energy (DOE), and how the Solar Energy Research Institute relates to the DOE. He gave us a rundown of how the money at DOE will be spent, showing that energy conservation and renewable energies still aren't being taken seriously and that the lion's share of research, development and demonstration funds is still going to fossil and nuclear programs.

Pat told us that the regional solar planning effort (of which SPOW is a part) was announced at the same time as SERI. The country was divided into 40 regions; 13 states compose our Western Region. Pat feels that the regional network should work closely with SERI, so that we could bring the "feelings of the people" to DOE and at the same time transmit information and resources from DOE to states, communities and citizens.

Al Lefohn, Environmental Protection Agency representative in Helena, reported to us on a recent meeting in Albuquerque of the Western Information Network on Energy. This group of library, university and other information-gathering people has formed because of a noted lack of direction from Washington, D.C., in the area of energy information dissemination.

Al described to us the Montana Integrated Energy Information Transfer System -- a "nonbureaucratic information delivery system". It is designed to provide 3 major services: 1) obtain publications through the library system; 2) provide on-line library search capabilities; and 3) obtain specific information about energy research projects (scope of work, most recent publications, etc.). It would draw information from a multitude of local, state and federal agencies in Montana: Universities, Montana Energy Office and other state agencies performing energy-related functions; Old West Regional Commission; federal agencies including FEA and EPA; and the Regional Energy Environment Information Center in Denver, Colorado. The Montana State Library will become the focal point for gaining access to the Energy Information Transfer System.

Kye Cochran reported briefly on the ongoing resource inventory work. AERO is compiling information on people and projects in the eastern part of the state; AERO-West in Missoula has just been given the same compilation task for the western part of the state. Results of this survey will be included in the Solar Planning Committee's Solar Directory, to be published next March.

Larry Geske, Chairman of the Financial Subcommittee, reported on the upcoming

Workshop for Financiers, to be held on November 15. Plans for the workshop were discussed on October 20th at a meeting in the Lewis and Clark Library, and a tentative agenda formulated. A questionnaire has been sent to all the banks in Montana, to determine what experience each has had with loans for solar installations; the return on these questionnaires has been excellent. The Energy Office is compiling a synopsis of the bankers' answers and comments.

Larry reported that the Financial Workshop will be geared toward discussion of various aspects of appraisal and banking and savings and loan problems, including: technical performance characteristics; impact on property values of solar installation; and types of loans available and possible. Fifteen to twenty people from the banking and finance community around the state will invited, with an eye toward distribution so that all parts of the state will be "covered". At least one expert with experience in solar financing (probably from California or Washington state) will be present.

Charless Fowlkes related an experience he had with the First National Bank in Bozeman; he asked the man what guidelines they would use in negotiating a solar loan, and the man said that they would assume that the solar system wouldn't work, and would have to be taken out and conventional system installed.

Dr. Horvath offered to talk at the Financial Workshop about life cycle costing and amortization.

Randy Moy and Kye reported on the Solar Directory; a good, comprehensive outline for this document has yet to be established, but Randy reported that Jan Konigsberg has been hired by the Energy Office specifically to coordinate the designing compilation and production of this Directory.

Dick Bourke presented a proposal to do an economic feasibility study of solar energy technology for Montana. He handed out a sheet describing his proposal. Charless mentioned that the federal government has a "Solcost" hardware costing system, and Gus Percha remarked that the economics seem to be covered when it comes to the hardware, but such things as passive systems, savings on food with solar greenhouses,

etc., might be worth doing a cost-benefit analysis on.

Dr. Horvath gave a rundown of the problems and successes we've had with questionnaires; the bankers' questionnaire worked fine, but it's really difficult to get opinions from the general public in a form and distribution that will mean anything. Dr. Horvath also reported on the meeting of the 13 states' solar representatives in Boise at the end of October; he said that Montana's grassroots approach has become quite well know. Then he left to answer a call from Hawaii concerning our solar effort.

Richard Klinger, prefacing his remarks by stating that he feels strongly that Montana does not yet have an energy policy, proposed to do a thorough study of the legal barriers to solar energy development in Montana. His scope would include: building codes, institutional uncertainties, land use, aesthetice, zoning, health and safety, utilities, rate structures, property taxes, HUD regulations for mobile homes.

Frank Culver gave us a rundown of the ways that the Department of Natural Resources and Conservation can visualize interfacing with the Montana Solar Planning Effort. They would like to do a study of Montana's residential energy use, and then determine specific ways that renewable energy could help reduce this. They would like to make a policy document for citizens using this information: they would list specific things Montanans could do and would predict what Montana would be like if their suggestions were carried out. They would stress economic, environmental, social benefits

Jim Lubek told us the time frame and costs for doing public service announcemen for public awareness of solar energy and of the state planning effort. He and Paul Cartwright would be responsible for producing these PSA's. Both costs and timing looked good so the Committee gave him tentative approval to go ahead with the project.

We adjourned at 4:00 P.M. to make way for a class that was meeting in the room we occupied.

MONTANA SOLAR PLANNING COMMITTEE

Minutes of the Meeting

Decmeber 2, 1977

Present: Jack Moore, Jim Parker, Paul Cartwright, Jim Lubek, Jan Kongisberg, Kye Cochran, Marvin Holtz, Frank Smoyer, Susan Brown, J. Lee Cook, Craig Decker, Gerry Knudsen, Bob Noble, Jim Whitehead

Jack Moore gave a report on the very successful Financiers' Workshop. We discussed what feedback we had gotten from it and what follow-up we will be conducting. J. Lee said that a transcript of the Workshop is being prepared.

Jim Parker suggested that we conduct a congressional district slide show for each senator and congressman.

Jim Parker described the procedure for our getting money from the Department of Energy for implementing the Western SUN solar plan, once it is decided upon. There will be a conduit, he said; perhaps this conduit will be the Interstate Nuclear Board. There will be an executive committee for Western SUN (the present executive committee, for the planning process, is made up of five members of the Solar Planning Committee. Each of the Solar Planning Committee members is from a state energy office. Randy Moy is ours). Jim suggested that forming an implementing body from state energy office people alone might be making use of a very narrow group. He felt that the implementing body should be drawn from a wider range of people with more varied expertise and experience. We discussed this.

Craig Decker told us what they've done in the New England region: they've set up a committee of high tech people, ignoring such outfits as Total Environmental Action and New Alchemy Institute. Craig said that there has been a good deal of discontent from the smaller groups in the East because of this.

Jim Parker suggested that perhaps what we should do in the West is to group together 3 or 4 states with similar characteristics and problems and have 3 people

chosen from each. These would meet regularly in the subregion and choose one from the 3 to represent the subregion of the Implementation Group.

Paul asked what might be some "common characteristics" of groups of states. Jim suggested similar physical characteristics, similar legislatural procedures, similar history of settlement, similar impacts of conventional energy growth, similar patterns of settlement, and similar way of life.

Jan Konigsberg wondered whether the regional solar planners will be suggesting policies. J. Cook said that this will be discussed in the upcoming Solar Planning Committee (regional) meeting in Hawaii.

Jim Parker suggested the following substitute for the present suggested format for implementation of the upcoming Solar Plan:

1. Divide the region in 4 subregions: 1) Alaska and Washington and Oregon; 2) California, Nevada and Hawaii; 3) Arizona, New Mexico, Colorado and Utah; 4) Montana, Wyoming and Idaho.

2. Have each subregion choose a coordinating council of 3 persons, 2 from the present solar advisory council and one appointed by the governor.

3. Have each coordinating council nominate one of its 3 people to be on the regular Implementing Body.

4. Appoint 3 extra people, drawn from regional constituencies, to be on the Implementing Body.

After some discussion on how the 3 extra people would be decided upon, we agreed to have Jim write up this format in a letter; Randy would take the letter to Hawaii as Montana's official suggested format for implementing the forthcoming Western SUN Solar Development Plan.

Jim Lubek handed out copies of his proposal to produce public service ads for the Committee. He said that we would be able to have them on the air in February

if we started moving on it now. Jim Parker asked to whom these PSA's would be directing people for more information: to Kye? to Gerry? to the Energy Office? Jim Lubek said probably the Energy Office, who can record the response. Jim Parker mentioned that the HRDC in Colorado has gotten $3,000 from DCA to do four 10-minute PSA's, which are being prepared now:

1. Energy Crisis
2. Home Energy Management
3. Low-Cost Solar Energy
4. Energy and the Food Chain

Jim Parker expressed reservation about our having general PSA's. He said he would rather see PSA's with a purpose. To inform people about the solar directory, or something like that. Jim Lubek reminded us that originally the PSA's were to deal with problems identified by the general questionnaires...but of course the questionnaires haven't yet been perfected.

J. Cook asked whether production costs go up if we wait a bit before we get started with the PSA's. Lubek said no.

J. Cook suggested that we tie a PSA in with the Governor's proposed short energy film and have the PSA answer questions that the film asks. Kye asked what the status of the film is at this point, and Jim Whitehead reported that they're still trying to get money for it and haven't finished the script.

Jan Konigsberg suggested having a PSA with a Bill 86 grantee talking about his project; this would be specific enough so that Montana people could relate to it. Jim Lubek expressed a desire also to use a PSA to counter some of the false claims of nuclear power advertisements.

There was a general discussion of how much money we would get for implement- in the final solar plan, and when we would get it.

Gerry Knudsen suggested, and we all agreed, that we should wait until we have our plan a bit more together before we do the PSA's.

We discussed the fact that Richard Klinger has been awarded $10,000 from the Renewable Energy Grant Program to do a research effort on solar energy development

constraints. We agreed that we should give him guidance on important areas to look into. J. Cook will get copies made of Klinger's proposal to send to each committee member.

We discussed the status of the general questionnaire. We're having a hard time getting a questionnaire written that everyone will agree is meaningful and will produce useful information. Gerry Knudsen suggested showing it to John Fitzpatrick, who is, says Gerry, an expert on that sort of thing. We agreed to have John look at it.

We discussed how to implement the final solar program, when it's decided upon. Jim Parker suggested that the state do a market survey so that we will know how to package what we want to propose, and who is the target for which sort of education and products. Susan Brown said that the Department of Defense may do that sort of thing (a market survey) in line with the redevelopment scheme that the Montana Trade Commission will be proposing for Glasgow Airforce Base. Theirs, she said, will be traditional market penetration studies.

Jim Parker described the meeting which the Montana Trade Commission held on December 1st in Helena for various renewable energy-involved citizens and organizations in Montana, to inform them about MTC's proposed renewable energy development scheme for Glasgow and to get their ideas and suggestions on the plan. Jim suggested that Susan have copies made of the handouts she distributed at that meeting and send them to members of the Committee. She agreed to do this, and gave us a brief rundown of what is in those handouts.

Jim Parker brought up the idea of this Committee's becoming an Advisory Committee on the implementation of the State Energy Conservation Plan, and it was agreed that this would be appropriate, since energy conservation is so closely linked with renewable energy development.

We discussed the Energy Extension Service situation. Ten states are implementing plans for setting up energy extension services; the other states, including

Montana, are getting $30,000 apiece to monitor what the ten chosen states do to set up their energy extension services. Paul Cartwright will be in charge of this monitoring in Montana.

We adjourned without setting a date for the next meeting, but agreeing that it would be sometime after Christmans.